Learning from Practice: Enhancing the Resilience of cities through Urban Design and Planning

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It is with some sadness, as well as satisfaction, that I reflect upon the conclusion of my doctoral studies, having enjoyed both the process of writing it and the accompanying period of my life. The PhD has given me a unique space to indulge my curiosity and explore a range of topics that are of professional interest and personal importance. In doing so I have also been lucky to have received support from range of people, whom I would like to thank.

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DECLARATION

All work contained within this thesis is the authors own. Whilst distinct elements were produced as part of the EU-funded DESURBS (Designing Safer Urban Spaces) and Harmonise (A Holistic Approach to Resilience and SysteMatic ActiOns to Make Large Scale UrbaN Built Infrastructure Secure) projects, contributions were carefully constructed to produce bespoke, contained tasks, which utilise the author's specialist expertise in the practical application of urban design.

Furthermore, no portion of the work has been submitted in support of an application for another degree or qualification of this or any other university of institute of learning.

ABSTRACT

The thesis draws from examples of practice as a means to find new ways of enhancing the resilience of cities through urban design and planning.

Literature reviews of urban design and governance provide the study with a theoretical base, whilst investigations of resilience connect and ground these earlier understandings. Accordingly, urban design is identified as a 'transdisciplinary space' for an ongoing socio-spatial process, governance provides integration and collaboration, and resilience is increasingly understood as simultaneously a theory, practice and tool for analysing systems response to disruptive challenge. It is thus contended that successful implementation of resilience initiatives requires a 'joined-up' approach to design and governance, with decision making enacted in a holistic and integrated manner.

Utilising an inductive, case study based approach, the foundation of the study is the contention that resilience can be enhanced thorough understanding and responding to earlier failures. Drawing from an analysis of urban incident case studies, the concepts of design weakness and maladaptation are used to conceptualise these failures in design, governance and ongoing management. Conversely, there is also consensus that building 'adaptive capacity' is another path to enhanced resilience.

A similar rationale was used to consider the Nottingham case study, which revealed the primacy of economic concerns in local decision making with a corresponding failure to consider risks in an integrated manner, underpinned by new policies of re-scaling, austerity and ill-considered national policy directives. Further investigation of individual design projects uncovered multiple maladaptations and inadequacies, as well as highlighting the difficulties of implementing institutional changes and the emergence of an 'implementation gap' between policy rhetorics and urban design practice.

The study concludes with some wider reflections and principles for 'resilient urbanism', whilst an exploration of resilient design implementation outlines an iterative process for more resilient cities through ongoing learning, innovation and transformative practice.

ABBREVIATIONS

100RC – 100 Resilient Cities programme

ABI – Association of British Insurers

ALO – Architectural Liaison Officer

ASC – Adaption Sub-Committee of the Committee on Climate Change

BSI – British Standards Institution

CABE – Commission for Architecture and the Built Environment

CCA – The Civil Contingencies Act 2004

CCC – Committee on Climate Change

CDM – Construction (Design and Management) Regulations

CRF – City Resilience Framework

CTSA – Counter Terrorism Security Officer

DCLG – Department for Communities and Local Government

DRR – Disaster Risk Reduction

EA – Environment Agency

FEMA - Federal Emergency Management Agency

FLAG – Somerset Flood Action Group

GI – Green Infrastructure

HSE – Health and Safety Executive

ICLEI – Local Government for Sustainability

IPCC – Intergovernmental Panel on Climate Change

LDF – Local Development Framework

LLFA – Lead Local Flood Authority

LRF – Local Resilience Forum

MfS – Manual for Streets

NaCTSO – National Counter-Terrorism Security Office

NPPF – National Planning Policy Framework

NYSERDA – New York State Energy Research and Development Authority

ODPM – Office of the Deputy Prime Minister

ONS – Office of National Statistics

PPG – Planning Practice Guidance

PPS – Planning Policy Statement

RIBA – Royal Institute of British Architects

RFCC – Regional Flood and Coastal Committee

RRF – Regional Resilience Forum

RTPI – Royal Town Planning Institute

SAB – SuDs Approval Body

SuDs – Sustainable Drainage systems

UNISDR – United Nations International Strategy for Disaster Reduction

UDC – Urban Design Compendium

UTF – Urban Task Force

WSUD - Water Sensitive Urban Design

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1 INTRODUCTION

1.1 BACKGROUND TO THE RESEARCH

In the last 15 years, the concept of resilience has emerged as a key consideration for urban theorists, academics and policy makers, whilst the term is also an important source of discourse in a diverse range of related fields (Coaffee, 2013a, 2013b; Davoudi, 2012; Walker and Cooper, 2011; Cote and Nightingale, 2012.). Globally, this period has seen significant shock events, disturbance and volatility with recent disasters, best illustrated by events such as the Tohuku earthquake or the impact of Hurricane Sandy upon New York; these events illustrate the vulnerability and potential weakness within the design, planning and management of contemporary cities, but perhaps also illuminate how we might enhance urban resilience in the future.

It is within this context that the often loosely-defined notion of resilience is seen as the solution to a range of contemporary concerns and complex problems; from disaster risk reduction, business continuity and climate change adaption, to the 'transition town' movement, which aims to empower and prepare communities for a low-carbon world (Hopkins, 2008). In echoes of this, the practice of urban design has been repeatedly championed as the answer to a range of urban maladies; in the 1990's it was at the heart of efforts to regenerate British Cities (Urban Task Force, 1997), later a key element of sustainable development (Punter, 2007) whilst more recently, it has been heralded as tool for making citizens happier and healthier (Montgomery, 2013). At the intersection of these two concepts is urban governance;

following the recent decentralisation of government power, new government arrangements have emerged to tackle the complexity of contemporary urban life, through traditional decision-making frameworks and more informal stakeholder networks. Accordingly, this study will draw upon the fast-developing literature of resilience and urban resilience, as a means to illuminate new forms of urban design practice and integrated governance.

This introduction will set out the framework for this research, including the significance of the study's urban focus and the emerging prominence of resilience and risk considerations to urban decision makers and built environment professionals, before reflecting on how we should learn about resilience from practice examples, and finally setting out the structure of the thesis overall.

1.2 THE EMERGENCE OF RESILIENCE

The topic of resilience is highly contested; from an academic perspective, the term emerges from theoretical models of ecology (Walker and Broderick, 2006), but work by psychologists, disaster managers, geographers, economists, social scientists and the military, have also been influential (Coaffee et al., 2008; Walker and Cooper, 2011). In parallel to this, the term has also expanded from a *"central organizing metaphor"* within national security discourses, towards wider policy rhetorics around emergency preparedness, foresight and response (Coaffee, 2013a). When Time Magazine recently declared that resilience was its buzzword of 2013, it cemented the importance of the terms contemporary relevance, but also highlighted the diminishing theoretical underpinnings behind its use (Walsh, 2013; Coaffee and Clarke, 2015).

Moreover, the ways in which ideas and practices of resilience have emerged in the past, the so-called *"cascade of resilience"* (O'Hare and White, 2013, p.275), also has a temporal quality that is highly specific to the context and emergent risks faced by particular countries and institutions. In the UK, the USA and Japan, for example, resilience became a highly politicised policy rhetoric in the wake of natural and human-induced disaster (most notably 9/11, 7/7 in London, Hurricane Katrina in 2005 and Sandy in 2012, and the Japanese earthquake and tsunami in 2011) and concerns that the infrastructural system and institutional frameworks *in situ* were ill-prepared to cope with similar future events. In mainland Europe the connection between city planning and resilience has emerged more slowly and has predominantly been associated with climate change adaptation and inland flooding. For example, in Germany debates around resilience arose as the result of severe flooding in Dresden in 2002 (Fleischhauer, 2009).

As these examples illustrate, it is important to consider what the focus for resilience should be, or what are we trying to be resilient to or against? Whilst foci for resilience are often contextual and temporally specific, there is a danger that reflexive responses to a particular event, ignore wider issues and potential synergies. Furthermore, the utility of and purpose of the resilience concept is itself increasingly contested and value laden, with growing criticism that it is operationalised as a tool of neo-liberalism, a cover for austerity and further public retrenchment, or a new form of what Foucault termed, 'governmentality', referring to forms of government in which individuals are taught to govern themselves, shifting authority away from the state (Dombrowsky, 2010; Theodore and Peck, 2011; Mackinnon and Derickson,

2011; Joseph, 2013; Slater, 2014).Despite this apparent splintering of views, there is increasing consensus that resilience and particularly urban resilience, can be understood as the capacity to withstand and rebound from a range of disruptive challenges, considered through the lens of an evolving range of contemporary risks (Walker and Broderick 2006; Leichenko, 2011; Scott, 2013; White, 2013; Stumpp, 2013). Further, resilience is increasingly important as a metaphor for inter-disciplinary integration within a range of traditionally separate fields (Coaffee, 2013a, 2013b; Wilkinson, 2011; Pickett et al., 2004; Vale, 2014); as the United Nations International Strategy for Disaster Reduction (UNISDR) (2012, p9) expands upon:

> *''[there is] a mounting recognition that disaster risk reduction, climate change adaptation and sustainable development are inextricably linked. These issues present mutually dependant challenges, which require collaborative, integrated strategies, strong governance, and innovative technological and financial solutions. Nowhere is this more evident than in cities. Complex, unique in their political and economic structures, and widely varying in the vulnerabilities they face, cities—and the growth they will experience over the next two decades—will give way to some of the 21st century's most important social and economic challenges and opportunities''*

Progressively more initiatives have been focused on cities, and the sub-genre of 'urban resilience', which arise from the particular vulnerability of these densely populated political, economic and cultural centres (see for example, Bugliarelio, 2003). The significance of cities in the 21st Century continues to rise, most notably as

a result of the growing global population, concentrated within urban areas; in 1913 only 10% of the world's population lived in cities, this had risen to 50% by 2013 and it is predicted that in 2050, 75% of an expanded global population will be urban (UN-HABITAT, 2011; UNISDR, 2012).

> *"For the first time in history, more than half the world's population lives in urban areas; by mid-century, the world's population will exceed 9 billion, and 70% of them will live in cities. Enabling those cities to deliver services effectively, save money and be sustainable – will be among the most important human undertakings of the current decade."*
>
> (UN-HABITAT, 2011)

These trends amplify the pressure upon cities to keep citizens safe, healthy, prosperous and well-informed. Whilst urban theorists promote cities agglomeration of innovation, creativity and economic resources, which are key to wider economic success (Glaeser, 2011; Florida, 2002); a variety of threats to life, property and society also converge upon the contemporary city, by virtue of their accumulation of population and critical infrastructure, as well as a lack of foresight in previous developmental regimes (Beck, 1992; Bosher et al., 2007a, 2007b; Coaffee, 2009; Edwards, 2009; Fisher, 2012).

In evidence of this, Godschalk (2003) identified the worldwide impact of natural disasters in 2001, as resulting in 25,000 deaths, $36 billion in economic losses and $11.5 billion in insured losses. Recent years have also seen the cost of urban disasters mounting (Zolli and Healey, 2013). Specifically, Fisher (2012, p.3) highlights

the dramatic increase in *"weather-related catastrophes",* such as floods, storms and drought, the occurrence of which have increased by over 400 times in the time period from 1900 to 2005. Consequently, issues surrounding water are often the critical vulnerability within the contemporary city; at present there are one billion people living on land vulnerable to flooding, but that figure will rise to two billion by 2050, with the cities of the developing world being particularly vulnerable (Fisher, 2012; UN-HABITAT, 2011; Rockefeller Foundation, 2013). Moreover, as Valdes et al. (2013, p.5) observe, the strengthening of the built environment emerges as a critical focus for wider societal resilience:

> *"Built environment acts as the core in every city and facilitates the everyday life of human beings. Any destruction to the built environment disturbs the functioning of the human society, and economic and social development of the country due to its strong connection with the human activities. "*

Within this urban framework, this thesis will explore the roles of urban design, and the governance structures that enable it, in promoting resilience in policy and practice. From a UK policy perspective, since the early to mid-2000's resilience has been a key organising metaphor for a range of measures and institutional arrangements to address civil contingencies and emergency preparedness, driven forward as a response to the terrorist attacks on the World Trade Centre in 2001 and the 2005 London Transport bombings (Coaffee et al., 2008; Davoudi, 2012; Davoudi et al., 2013). More widely, the need for resilience has underpinned a range of policies which address other issues, such as pandemic influenza, terrorism and flooding.

However, there is a growing acknowledgement that the dominant understandings of resilience are theoretical in conception and top-down in nature, and too often insufficiently grounded in practice or connected to the work of everyday stakeholders (Davoudi, 2012; Coaffee and Clarke, 2015). In evidence of this, only recently has the formalised planning system begun to integrate policies of resilience into its strategies. As of 2012, the need for resilience has been embedded in UK planning policy through the National Planning Policy Framework (NPPF)(DCLG, 2012a) which states that Local Planning Authorities should:

> *"…work with local advisors and others to ensure that they have and take into account the most up-to-date information about higher risk sites in their area for malicious threats and natural hazards, including steps that can be taken to reduce vulnerability and increase resilience"*

More specifically, planning and urban design are increasingly seen as a critical medium for the emerging practice of resilience (Coaffee, 2008, 2013a, 2013b; Coaffee and Bosher, 2007; Fisher, 2012; Vale, 2014), as Valdes and Purcell (2013) articulate:

> *"Urban planning and design has a key role to play in defining a city's and urban area's resilience. It can address some of the underlying risk factors linked to natural hazards and related technological and other disasters, and reduce the exposure of people and assets and their degree of vulnerability in the context of rapid urbanization."*

Despite the growing importance of planning-led urban resilience, a range of studies have noted the limited uptake within the built environment professions (Bosher and Coaffee, 2008; Coaffee and Bosher, 2008; Chmutina et al., 2014), particularly as a result of a lack of collaborative working. Whilst this echoes the wider dearth of grounded resilience practice (Davoudi, 2012; Clarke and Coaffee, 2015), it also begs the question of how we can promote resilience within the design and development of cities? Furthermore, can an understanding of resilience within this context, more widely illuminate practical and grounded approaches to resilience?

In his book *"Designing to avoid disaster: The nature of fracture-critical design"* (2012, p.xi), Thomas Fisher argues that in order to promote resilience within the built environment, it is necessary to understand the role of design errors in earlier failures and learn from practice experience:

> *"What distinguishes many of the disasters we have faced recently is that they have stemmed largely from design errors, from mistakes of our making. As such, they remain within our control, for if we have designed our way into these disasters, we can design our way out of them. But we first have to understand the nature of our errors so that we don't simply repeat them, as we have been doing over and over in recent years."*

This approach is central to this study, but it is important to acknowledge that other investigations have used similar methods; Vale and Campanella's (2005) *"The Resilient City: How Modern Cities Recover from Disaster"*, used reviews of historic disasters as a way to inform strategies for recovery. Whilst the late, great Sir Peter Hall (1980), also used examples of "Great Planning Disasters" to illustrate principles

of more informed planning. It is thus the intention of this research to consider how the design, planning and governance of urban spaces can enhance the resilience of cities in proactive and integrated way, and in doing so draw from prior practice, both good and bad. This should not be seen as a purely technical exercise, but should also consider the complex interaction of social, political and institutional factors.

Appropriately, there are growing parallels between the importance of 'resilience thinking' (Walker and Salt, 2012) as a way of managing complex socio-technical issues and the emerging theories of urban design and governance. Whilst urban design practice has traditionally concerned itself with promoting idealised urban form (Ellin, 1999; Waldheim, 2007), there is a growing understanding that it should be understood as an ongoing process that is shaped by a variety of social, environmental and technical factors (Madanipour, 1996; Cuthbert, 2007), rooted within the location's unique context. Thus, Carmona (2014) proposes that urban design is part of wider 'place shaping continuum', whilst others highlight its value as an integrative and collaborative practice (Cowan, 2003; Corner, 2004; Oc and Tiesdell, 1996). These viewpoints, which promote integration and collaboration between built environment professionals and stakeholders who have not conventionally been involved in the promotion of urban form, is well articulated by Corner (2004, p.3):

> *"Contemporary urban projects demand a new kind of synthetic imagination—a new form of practice in which architecture, landscape, planning, ecology, engineering, social policy, and political process are both understood and coordinated as an interrelated field... Working inclusively and collaboratively*

across multiple scales and with broad scope, strategic design intelligence can surely move toward a more effective and powerful form of urban design."

This move towards greater integration and collaboration in urban design mirrors a wider understanding that effective governance requires the breaking down of traditional silos between professions and practices, and addressing problems in a holistic way (6 et al., 1999). In relation to enhancing the resilience of the city, Coaffee (2013b, p.4) describes how:

"The new governance approach to enhancing urban resilience emphasizes 'joined-up' approaches to decision-making. Whereas traditional approaches to urban risk have relied upon a narrow range of stakeholders, contemporary and future schemas hope to draw a full range of professional and community groups into decision-making at a range of spatial scales, from locally coordinated systems to centralized and sub-national organizations"

In the UK, governance and planning reforms, initiated during the 1990's, provide inspiration on how to integrate policies and empower local stakeholders, as well as highlighting potential conflicts around rescaling and responsibility. Similarly, the increasingly local nature of resilience initiatives are themselves contested, with a tension emerging between the desire to provide greater local accountability and engagement, with a wide narrative of increasingly distanced, neo-liberal governance approaches that erode the power of the state (Edwards, 2009; UNISDR, 2012; Coaffee, 2013a, 2013b; Joseph, 2013; Coaffee and Fussey, 2015).

Within the wider context of this study Healey's (1997) idea of "collaborative planning", which provides a way to mediate the competing needs of different stakeholders, is particularly helpful for promoting collaboration and integration within a complex and dynamic world, and as a means to evaluate contemporary, local practice in an era of new policy, public budget cuts and austerity.

1.3 THE PAST, PRESENT AND FUTURE RESILIENCE OF CITIES

The 21st Century is set to be the century of the city (Smith, 2012). In line with Fisher's (2012) ideas, the study will reflect upon and evaluate how cities have persisted and thrived (or not) in the long and recent past. By utilising a historiography approach, it will illuminate potential directions for current and future resilience practice. Appropriately, Fisher also notes that the medium of design is concerned with the world as it could be, meaning that the focus cannot always be on the past and thus this research will also consider the future resilience of cities.

> *"By studying historical examples, we can learn the pressing questions that have been asked in the past as cities and their residents struggled to rebuild... How has the symbolic power of the built environment been used as a magnet for attack and as a signal for recovery? What does each particular process of recovery reveal about the balance of power in the society seeking to rebuild? Whose vision for the future gets built, and why?"*
>
> (Vale and Campanella, 2005, p.9)

The first cities were built by the Sumerians around 3500BC, as the climate of what is now known as Iraq, became cooler and drier, so that this once swampy region was

ideally suited to growing a range of crops, and which generated an abundance of food (Smith, 2012). This combination of environmental conditions would be critical to the first emergence of cities in this part of the world. Moreover, the city was central to the Sumerians way of life, as a place of abundant food and water, a location of safety and sanctuary from the harsh natural world. These early cities have wider significance as the cradles of civilisation and catalysts for human ingenuity and creativity; amongst the first of the innovations to emerge from the region was writing, which developed in the city of Ur as a tool of the municipality's administrators. However, the changing climate would also lead to the downfall of Sumer's cities; as the region became more arid and dry, it became ever more difficult for the region's cities to sustain crops and provide the concentrated populace with food, water and safety; they were eventually abandoned (Smith, 2012).

This relationship between the development of the city, the safety and wellbeing of citizens, environmental and climatic conditions, are all inextricably linked. From a climatic perspective, the last 10,000 years, which is known as the 'Holocene', have been *"extraordinarily stable"*; in stark contrast to the preceding time period, the 'Pleistocene', which was notable for violent climatic variability that prevented man from growing the necessary food to sustain cities (Burroughs, 2005).

This is particularly relevant given the acknowledgment in recent years that the world is entering, or has already entered, a new climatic age, known as the 'Anthropocene' (Crutzen and Stoermer, 2000). As a result of man-made or anthropogenic activity, the global climatic system is becoming more volatile and this brings new challenges for humanity and urban life (Biermann, 2014; Oldfield et al., 2014). Despite dire

warnings of increased storms, droughts and floods (IPCC, 2014), Biermann (2014) suggests that the primary challenge will be political; how we create governance institutions to address these challenges in a collective way. In other words, how do we effectively build governance systems that tackle the challenges of climate change and enhance resilience?

In echoes of Fisher, Geoffrey Parker (2013) argues in his recent book "*Global Crisis"*, that the way to meet the challenges of the 'Anthropocene', is through examining and learning how earlier cities, nations and societies have dealt with environmental crises. Despite the historical focus of this work, the rationale couldn't be more contemporary. As Parker (2013, p.xvi) notes, contemporary society still miscalculates or ignores future risks:

> *"In the course of 2011 over 106 million people around the world were adversely affected by floods; almost 60 million by drought; and almost 40 million by storms. Yet although we know that climate caused these and many other catastrophes in the past, and although we know that it will cause many more in the future, we still convince us that they will not happen just yet (or at least, not to us)."*

Such a rationale lay behind the events of October 2012, when the city of New York was hit by a devastating storm surge, driven by the tropical storm Hurricane Sandy. Whilst the event thankfully only led to the loss of one life, it caused widespread flooding of streets, tunnels and subway lines, and a significant loss of power across the city. More significantly, it was apparent that it had pushed the city's capacity to cope to its very limit, with anecdotal reports suggested that only two of the city's

seven hospitals had functioning power, which could have been disastrous in the event of significant casualties[1]. Critically, many of these impacts were predicted by a 2011 report, *"Responding to Climate Change in New York State"* (ClimAID) (NYSERDA, 2011), which highlighted the vulnerability of the cities assets and in particular the poor siting of critical infrastructure. More worryingly, the ClimAID report suggested that as a result of climate change, New York could see events of a similar impact which could potentially occur as frequently as 1 in every 4 years by 2070.

The financial impact of the event was estimated to have been over $70 billion; whilst the city was hit by a much larger storm in 1938, Wagner et al. (2014) suggest that the 2012 event caused more extensive damage, suggesting that the city was more vulnerable to such an event than in the past. By the majority of measures, New York is both the most economically and culturally significant city in the world[2], so it is telling that the world's most important city should be shown to be so underprepared for an event of this magnitude. This example is explored in greater detail in Chapters Five and Eight, which highlight the steps the city and state are making to actively build resilience.

This example further highlights the importance of looking forward to consider future hazards and potential impacts, which it is contended has been a flaw in many recent resilience initiatives. Crucially, there is growing consensus that climate change will lead to a world with more extreme weather events and greater threats to humanity;

[1] This example was provided by a study interviewee with expertise in energy supply networks.
[2] Golobal Cities Index, 2014; Global Economic Power Index, 2014; The Wealth Report; Global City Competitiveness Index – see Gloablization and World Cities Network.

the recent report by the Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2014 Impacts, Adaption, and Vulnerability: Summary for Policymakers* (2014, p.6), highlights that the world is likely to experience more extreme heat, flooding, drought, storms, rainfall and even *"violent conflict"*. Similarly, a report by the World Bank (2014) suggests that the recent pattern of extreme weather events is now the 'new normal.' Critically, they also highlight the great differences in vulnerability and exposure internationally, which are as a result of non-climatic factors, including a lack of foresight and preparedness amongst government institutions, access to critical infrastructure and the comparative lack of resilience within the built environment. In particular, there are significant synergistic risks between climate change effects and the concentrated populations within cities.

Given this context, it is unsurprising that resilience is increasingly used as a way to conceptualise a range of measures used to address climate change impacts (Fungfeld and McEvoy, 2012; Leichenko, 2011), and is of the utmost importance for humanity.

1.4 THE STUDY

> *"We need more resilient design, not as a fashionable buzzword, but out of necessity for our long term survival."*
>
> (Mehaffy and Salingaros, 2013)

Cities are architectural palimpsests, rewritten by every generation and responding to the needs of citizens and their political and environmental context (Smith, 2012). This thesis, through a study of practice cases, questions how cities can be

reconfigured: physically, socially and environmentally, to address a range of disruptive challenges and to build resilience. More specifically it asks:

- What can we learn from earlier shock events and what lessons can be drawn for future practice?

- From a UK perspective, how can an evaluation of local governance arrangements and the framework for resilience be used to understand the effectiveness of national resilience policies?

- How can a review of local urban design projects, help us to understand the appropriateness of design and planning approaches to the urban resilience imperative?

- How can urban design and planning be used to secure cities against multiple risks and make them resilient to exogenous shocks?

Utilising a multi-site, embedded case-study approach in the Nottingham city-region and drawing extensively upon an 'incident database' containing 100's of prior disruptive challenges faced by cities, this research will attempt to answer these questions.

1.5 THESIS STRUCTURE

The study consists of nine chapters arranged into two main parts. Following the introduction, part one (chapters 2-4) considers the conceptual and contextual basis of the thesis.

Chapter 2, *The Theory and Practice of Contemporary Urban Design* outlines the rise of urban design from the 20th Century onwards. From historic precedents, it charts the emergence of theoretical 'paradigms' which have evolved from wider theoretical discoveries and in response to the conditions and conceptualisations of the contemporary city. It is argued that these paradigms also reflect the changing relationship between planning, architectures and city development. Finally, the review marks a trajectory from a stale practice, concerned with architectural forms, idealised views and typologies, to a more vibrant 'transdiciplinary space' informed by social and environmental dynamics, and long term stewardship of place. Accordingly the chapter concludes with key findings for urban design practice and how these might feed into a broader paradigm of urban resilience.

Chapter 3, *Urban Governance and Design Decision Making* introduces the significance of governance to the study, beginning with a review of the terms meaning and its encapsulation of distanced and network institutions. The history of UK governance is explored, including the critical shift from 'managerialism' to 'entrepreneurialism', as well as the reforms of government conducted under the New Labour government (1997-2010). Accordingly, these reforms, including holistic and multi-level government, are scrutinised and critiqued, before critical ideas from 'collaborative planning' and 'new spatial planning' are identified as key to the implementation of resilience and urban design strategies. After a review of recent policies with particular relevance to the study, the chapter concludes with a series of key findings that might aid in the enhancement of city resilience.

Chapter 4, *Towards Urban Resilience: Integrated Governance and Design* explores the concept of resilience and its role as an integrator of urban design and governance. The chapter begins with an outline of the critical context for resilience and its emergence from ecological theory and more grounded approaches. The importance of complexity theory to resilience is explored, whilst also looking at ways to move the term from theory to application, including 'resilience thinking' and the shift to 'urban resilience'. Accordingly, the 'resilience turn' in public policy is explored from the perspective of the UK, outlining the increasing sophistication and contextuality of the approach, as well as emerging tensions that surround the development of the concept. Using these understandings, and those gleaned from earlier chapters, key approaches for enhanced urban resilience are proposed, before the chapter concludes with a reflection upon how design, governance and resilience can inform a performative and practical 'resilient urbanism', that will form the basis of the analysis frame used in Chapters 6 to 9.

Part 2 of this study begins with, Chapter 5, *Methodology and Research Design* to outline the design and methodology of thesis, as well as its inductive approach. It explains the rationale for the studies multiple case studies and single, embedded case study methodology and how these will illuminate the study objectives. Finally, the chapter sets out the analytical methods used and provides justification for the interpretive techniques utilised.

Chapter 6, *Urban Incidents Weakness Analysis*, is an exploration of urban incidents, based upon Fisher's contention that designers of the built environment have neglected to learn from past failures, and that doing so offers learning opportunities

which are particularly relevant to attempts to enhance the resilience of cities. In response to the complex nature of these incidents, the chapter utilises the population and analysis of a large database of urban incidents to identify trends in areas of responsibility around failures, as well as a series of nine generic, 'Design Weaknesses'. These weaknesses are further explored through a series of representative case examples, before using a similar approach to consider incidents from the perspective of the three risk management stages; reflecting on examples of where risk management approaches have contributed, positively or negatively, towards failures or enhanced resilience. Using these understandings, the chapter concludes with some wider lessons, viewed through the critical lens of maladaptions.

Chapter 7, *Nottingham Governance Challenges*, considers the governance processes for resilience *in situ* as a means to highlight issues unique to the city, as well as learning lessons with wider significance for practice. This approach is built on an understanding of the role of network governance in local decision-making processes, and uses the exemplars of holistic governance and Healey's 'collaborative planning', as a comparator for practice. This considers both formal and informal practices, with a particular reflection upon the ability of stakeholders to accommodate the organisational change necessary for enhanced resilience. Analysed by stakeholder groups, it distils commonalities and disparities around their engagement with risk and resilience, integration with other stakeholders, professional priorities, concerns and adaptive capacity. This chapter provides a patchwork picture of the local governance framework for urban design and resilience.

Chapter 8, *Nottingham Urban Design & Flood Resilience Study*, looks in further detail at a number of development examples within the embedded case study area, as a means to understand the practices of urban design with respect to resilience. As the previous chapter identified flooding as the most significant risk within the area, and housing as both the predominant development type and where risks are most likely to be overlooked, the chapter concentrates on these issues. Furthermore, stakeholder interviews used real-world 'vignette' projects, as a means to explore issues of design and governance relating to resilience, which are further developed to explore issues of design *in situ*. Findings are utilised from Chapter 2 to provide the foundation for observations and critique of the vignettes urban design, whilst the 'design weaknesses' identified within Chapter 6, were used to analyse how urban design had responded to the site specific flood risk. The chapter concludes with a series of detailed learning points, commonalities and concerns.

Chapter 9, *Lessons from Practice, Analysis & Conclusions*, begins by looking at how resilient design is being implemented in New York, with new initiatives that attempt to address the city's vulnerabilities which were exposed by Hurricane Sandy, but also present an opportunity for more radical adaptation that integrates wider co-benefits through the use of green infrastructure. This reflection provides a counterpoint to the findings of the empirical chapters, which are considered against the study's research questions, and uncover the widespread maladaptive design and governance practices, most notably surrounding the consideration of flood risk. Accordingly, UK flooding and adaption are explored in further detail, outlining how protection within the UK has been eroded by 're-scaling' and the implementation of

new planning policies; in effect an implementation gap emerges between resilience theory and urban design practice. Following a summary of study findings, and the identification of principles for resilient urbanism, the thesis concludes by considering how the 'implementation gap' in resilient urban design practice, can be bridged.

Accordingly, the following Chapter uses a genealogy of urban design theory and practice, to provide a foundation for the study's urban medium.

2 THE THEORY AND PRACTICE OF CONTEMPORARY URBAN DESIGN

2.1 INTRODUCTION

The purpose of this chapter is to examine the topic of urban design, exploring the subject's trajectory of theory and practice, whilst reflecting on the success of the different approaches and paradigms that have emerged during the last century. In recent years, urban design has been repeatedly identified as the key medium for meeting a range of successive urban problems, including climate change, sustainability, health and well-being, terrorism, disaster risk reduction, community empowerment and resilience (Punter, 2011; Oc and Tiesdell, 1996; Coaffee and Bosher, 2009; Montgomery, 2013; Deshkar et al., 2011; Valdes and Purcell, 2013); as Lang (2005, p.xix) notes:

> *"Of all the design fields, urban design has the greatest impact on the nature of cities and city life. However logical the land-use pattern prescribed by city planners, the beauty and utility of its buildings and the nature of the landscape, it is the overall three-dimensional combination of forms and spaces as seen in time and over time that gives a city its character."*

This chapter will describe the journey from a sometimes stagnant, urban design theory, primarily concerned with urban form and the arrangement of architectural elements, to a more holistic, collaborative urbanism, which emerges from a wider understanding of urban processes and dynamics (Corner, 2006), and which can inform the connection with urban resilience ideas.

The chapter is structured into five parts and begins with an investigation of the origins of urban design and its historic precedents, whilst also introducing the evolving roles of form and function, rationalism and romanticism, the *"natural city"* and the *"planned city"* (Broadbent, 1990), which lie behind the different 'paradigms' of urban design theory. Critical to this review is the idea of a cultural pendulum that swings in the opposite direction from earlier urban design approaches, producing new ideas and evolving earlier theory, as Ellin (1999, p.298) proposes:

> "*We might understand the history of urban design theory as that of a continual search for the most harmonious balance between control and freedom, a search for the order which liberates rather than oppresses. Each generation reacts to deficiencies in its physical and social landscapes, so the search swings back and forth like a pendulum from rationalism to romanticism and back to rationalism."*

Using this framework, section 3 will explore a series of urban design paradigms that have emerged since the start of the 20th Century, and use them to reflect on the successes and failures of successive urban design theories and practice. In particular, the study will look in greater detail at the practice of "re-emergent urban design" (Oc and Tiesdell, 1996), which accompanied the UK's Urban Renaissance and the New Urbanism that emerged from the United States, before reflecting on an emerging paradigm of ecological and integrated urbanism. The section will conclude with a summary of findings with particular relevance to this study.

The fourth section will consider current practice of urban design, as a policy of "interface" between professions (Punter, 2007; Oc and Tiesdell, 1996; Waldheim,

2008), before reflecting upon the more socially informed processes of urban design. It will be argued that earlier paradigms have been too reliant on urban from as a driver for spatial orders, as Corner (2006, p.029) suggests:

> *"... future urbanisms must derive less from an understanding of form and more from an understanding of process – how things work in space and time."*

This review will attempt to delve deeper into contemporary considerations of urban design, incorporating reflections upon new and emerging agendas, which demonstrate the almost limitless scope of the urban medium; urban commentator Sorkin (2011, p.57) borrows the words of Mao Tse-Tung, when he declares:

> *"Let a thousand urbanisms bloom!"*

Section 5 concludes the chapter with a series of key findings and conclusions that the literature review has uncovered.

2.2 ORIGINS OF URBAN DESIGN

Urban design is a concept that is often innately understood by interested individuals, but is much more difficult to articulate and define as a simple, tangible exercise. As Madanipour (1996, p.92) noted, *"...urban design is far from a clear area of activity."*

One definition of urban design, as taken from the Dictionary of Urbanism (Cowan, 2003), describes it thus:

"The collaborative and multi-disciplinary process of shaping the physical setting of life in cities, towns and villages; the art of making places; design in an urban context."

This definition, whilst offering a simple explanation of the activity of urban design, does perhaps not elaborate the much wider significance and potential implications necessary for the consideration of urban design in a contemporary context, as this chapter will seek to illustrate. But importantly, it does recognise that urban design is both "collaborative" and a "process", which involves different professions and elements, including the design, composition and planning of buildings, spaces and cities. Furthermore, Cowan's definition fuses clear, objective terms about physical settings and urban context, with softer, more subjective words, such as art, place and design. This would appear to mirror the dichotomies within urban design itself, that often seek to balance art with logic, aesthetics with functionality, and within an arena that for some is defined purely by physical elements, to others as a vital art form, whilst there are those who offer an entirely different point of view altogether based on social and political considerations (Madanipour, 1996).

Historic Urban Design

When considering the historic role of urban design, Broadbent (1990) notes that the design of urban spaces actually predates the role of town planning as we currently know it. The arrangement of buildings within a settlement was an important consideration prior to the creation of the first planned city of Babylon in 1126 BC (Broadbent, 1990), whilst classical texts by Hippocrates and Aristotle reflected on the importance of building aspect, and Vitruvius wrote at length on the best city forms

for defence and access to critical infrastructure (Mostafavi and Doherty, 2010). For Eastern civilisations, the form of the city had sacred significance (Knox, 1987; Smith, 2012). The work of these early philosophers and theorists has continued to filter through into the city of today, with Broadbent (1990) in particular, noting how the principles of Islamic architecture influenced the development of European urban design during the Renaissance, and which in 1630 inspired architect, Inigo Jones, to layout Covent Garden as London's first public piazza. Perhaps the most significant understanding that can be taken from these apparently disparate examples is the idea that urban design can work at a range of scales, from individual spaces and buildings, to encompassing whole cities, and involves both the conceptualization and physical realisation of these ideas.

In relation to this study, there is a long historic precedent for using urban design strategies to improve the safety or security of a city. Most notably Houssemann's renovation of Paris during the 19th Century, with its introduction of wide avenues, squares and boulevards, that not only served to make the city a more attractive, grand and 'legible' place, but also meant that the streets could not be so easily barricaded, thus discouraging the rioting and civil disobedience that had often taken place in Paris (Douglas, 2007; Lynch, 1960).[3] These early examples vividly illustrate how the design of urban spaces can shape their function and character.

However, even in the earliest stages of historic development, Broadbent (1990) notes two critically differing approaches to the creation of urban form; the "natural

[3] In a similar vein, Moore (2012, p.133) notes how Trafalgar Square was created in the 19th Century, by an act of *"urban cleansing"* to replace a neighbourhood of small streets which were a centre for vice and prostitution. The Square's great physical dimensions were a deliberate ploy to discourage an activity requiring greater intimacy, but one that has a created a space labelled sterile and boring today (Moore, 2012).

city" and the "planned city." Where urban form either develops organically or is imposed for a particular purpose and the intrinsic advantages and disadvantages that result.

2.3 PARADIGMS OF URBAN DESIGN

Ellin (1999) locates the emergence of 'traditions' of urban design theory, as part of a wider nostalgic, societal trend in response to the increasing "*globalization*" and "*placelessness*" seen in cities during the early 20th Century, which resulted from modernist urban strategies; she terms this "*postmodern urbanism*".

> *"The infatuation with the past and with mass imagery in urban design might be understood as part of a larger search for meaning and security in a world which appears increasingly meaningless and scary."*
>
> (Ellin, 1999, p.104)

In echoes of Broadbent's dialectic of a *"natural*" or "*planned city*", Ellin (1999) offers an alternative conception of how urban form is shaped, describing it as following a swinging pendulum between *"rationalism"* and *"romanticism"*, with rationalism representing modernism and romanticism referring to the responding interest in a reinvigorated built environment through urban design. Citing Ley, Ellin (1999, p.270) suggests that romanticism is about *"the subjective, the interpersonal and the aesthetic"*, whilst rationalism is "*functional and technological*". Moreover, as Brown (2008, p.66) suggests, urban design is also a product of cultural and societal developments:

"Urban design, like all fields, follows trends and fashions and is pushed by available resources, particularly funding."

This review will consider the ideas and practice of urban design which have followed modernism and the resultant post-war urban developments, up until the present day, with further examination of the theories that have informed these approaches. Ellin (1999) suggests that within the romantic turn of postmodern urbanism that occurred during the 1970's, there are two broad traditions: Anglo-American, which is empirical and perceptual, and the European which is formal, rational and theory based. However, it is contended within this review that it is not possible to label all urban design approaches as romantic or postmodern and that these definitions based upon perception, classical traditions and mass imagery, do not reflect the wider discipline that has arisen in theory and practice since the late 1990's.

Rather, this study will consider the development of urban design theory and praxis as a series of broadly chronological paradigms which develop incrementally from earlier ideas, but include smaller nested pendulum swings, such as conceptions of function and form, the importance (or not) of context, the influence of different professions and stakeholders, the 'planned city' or 'natural city', whether the city was inherently good or bad, and of course rationalism and romanticism. In effect, these paradigms work much like Massey's (1994) "waves" of capitalistic economic development which accumulate like rock strata, each one imparting deposits of ideas upon both the city and urban design practice, and helping to shape the subsequent paradigms even as the approaches diverge.

"An urban design paradigm is a generic solution to a set of problems that is set up as an exemplar of good practice."

(Lang, 2000)(cited by Hall, 2002)

Whilst this section is not a review of planning, architecture or social theory, all of these elements are at some point relevant to the development of urban design thought. The Paradigms are summarised in Figure 2.1, and will be unpicked in the text below.

Table 2.1 – Summary Table of Urban Design Paradigms

PARADIGM	KEY IDEAS
Modernism 1940's -	Rationalism, form follows function, standardised, no context, planned city, large scale, utopian, socially homogenous, public sector, planner designed and implemented.
Urban Form 1950's -	Romanticism, celebrated urban life, urban form holds social processes, "natural city", no formal planning, smaller scale, vernacular, traditional, designer led, visual management, context and composition.
Environmental Determinism 1960's -	Rationalism, urban mosaic, city as social organism, psychology basis, form has meaning, human ecology, design to cure the city, stimulate urban life, control behaviour through design, legibility.
Postmodern 1970's -	Romanticism (with elements of rationalism), context important, collage city, appearance is critical, ornamented, interchangeable ideas, historic form, elements of rationality, pluralist, urban design led, incrementalism, formal planning rejected.
Post-Urban 1980's -	Economic rationalism, form follows finance, context irrelevant, no social consideration, Bigness, no planning, urban decline, edge city, architecture replaces the city, urban security, freemarket led.
Urban Renaissance 1990's -	Romanticism (with elements of rationalism), context important, urban focus, design excellence, regeneration, re-emergent urban design, iconic architecture, city competition, limited urban planning, private sector urban design led.
Ecological & Integrated 2000's -	Rationalism (with elements of romanticism), context is critical, form is irrelevant, social and environmental process are central, time considerations, return of strategic planning, adaptive design, bottom up, stakeholder engagement.

Source: Compiled by author.

Modernism

The paradigm of Modernism saw a dramatic remaking of the traditional city using principles and guidelines set down in the Athens Charter of 1943, and enacted across the globe in the years following the Second World War (Gehl, 1987; Allmendinger, 2001; Hall, 2002; Cullingworth and Nadin, 2006). Inspired by manufacturing and technological developments, the theoretical origins of the paradigm can be traced to the French architect Le Corbusier (1927, p.xxv) who declared:

> *"Decorative art is dead. Modern town planning comes to birth with a new architecture. By this immense step in evolution, so brutal and so overwhelming, we burn our bridges and break with the past."*

Le Corbusier's writing is often highly quotable, but few passages are as radical, dramatic, inspiring and simultaneously disquieting as this one. His work concentrated on radical, grand scale planning of an idealised city, utilising high-level strategic plans for cities and regions, with more detailed arrangements of high-rise buildings around large green spaces, illustrated by monumental perspective drawings taken from imaginary aircraft (see Figure 2.1, below). Somewhat ironically, Modernists were particularly inspired by Ebenezer Howard's (1898) "Garden City" movement.[4] Context, ornamentation and earlier, more human-scale urban forms, such as streets and historic buildings, were all deemed irrelevant and redundant. Le Corbusier's approach was entirely utopian, and not based upon empiric, practice

[4] Howard shared Le Corbusier's revulsion and rejection of the traditional city; proposing a rationally planned, wheel-shaped urban form, with clearly delineated land-uses all set amongst gardens and open space to produce what Howard argued was a fusion of the best elements of town and country. However, the consequences of the modernist plans was far from the green utopia they envisaged; in the words of Lefaivre (1989, cited by Elli, 1999, p.17), the resultant urban landscapes were *"synonymous with inhumanity, desolation and devastation."*

evidence or social considerations. During this period planners were uniquely able to make titanic plans for cities and see them through to implementation, often against the wishes of the communities they impacted upon (Hall, 2002; Allmendinger, 2001).

Figure 2.1 – Le Corbusier's "Radiant City"

(Source: Le Corbusier, 1927)

Hall (2002, p.261) elaborates on the significance of this period between planning and urban design:

> *"... in cities all over the world, this was condemned as the failure of "planning."...Planning is just what it is not. But, as Jon Lang has pointed out, it does belong to a genre of urban design..."*

The implication of this is that rather than considering the wider social significance of developments, they were driven by objectives of aesthetic form. Hall's point is further elaborated by Moore (2012, p.69) who suggests that Le Corbusier's ultimate failing was that, *"he overrated the redeeming power of the physical object."* Critically, Le Corbusier's (1927, p.27) assertion that "*all men have the same needs*", also fails to acknowledge the diversity of urban society by promoting a homogenous ideal.

In summary, modernism drew scathing criticism from many commentators, including Jacobs (1961) and Mumford (1961), for the damage it caused to cities, communities and urban life, and which in turn led to the emergence of new paradigm's of urban design and planning, as writers and academics sought to remedy these mistakes.

Urban Form

This criticism of modernism and the urban landscapes it produced, coincided with a renewed interest in traditional urban form during the 1950's, and in particular the critical importance of context in creating successful places for the people that inhabited them. This meeting of interests, as society sought a better form of urbanism than that left in the wake of modernism, could be said to be the birthplace of urban design as a distinct area of practice (Ellin, 1999; Waldheim, 2008).

The publishing in 1961 of *"Death and Life of Great American Cities"* by Jane Jacobs was key to the move away from modernist town planning and a source of inspiration for many contemporary urban designers (Ellin, 1999). Resonant with a wider mistrust of formal planning (Hall, 2002), Jacobs (1961, p.13) celebrated the informal,

the natural, the human, and critically the social aspects of urban life; values which were encapsulated within the built environment and threatened by *"the pseudoscience of city planning."*

Jacobs proposed a simple formula for a good city using attributes of urban form, including high densities, mixed land-uses and the retention of older buildings. Based upon her observations of city life, she also argued that the urban environment could affect security, suggesting that greater numbers of people within public realm, or indeed looking onto it, provided superior individual safety (Broadbent, 1996); Jacobs referred to this as *"eyes on the street".*

In parallel to these developments, geographers in the UK studied the patterns of historic settlements, as a means to understand the processes which had shaped them (Whitehand, 1987); they called this work urban morphology. The work of Conzen was particularly influential (1975, cited by Whitehand, 1992), advocating an approach based upon detailed cartographic study, fieldwork and analysis of plots and linkages over time, as a means to uncover the hidden logic contained within the "natural city"; illuminating the unconscious and underlying processes which have shaped a place. Although the practice of urban morphology was not intended as a methodology for the design of built form, Whitehand (1987) proposes the use of Conzen's ideas, as a way to manage change in urban settlements.[5]

[5] Despite Whitehand's (1992) suggestion that Conzens theories had rarely been followed outside academia, Madanipour (1996, p.56) argues that the approach provides *"an empirical form of study",* which has been used to inform urban strategies ever since.

Conzen (1960) also popularised the use of the term "*genius loci*"[6], which is commonly used within urban design circles today to describe the feel and character of a place. Conzen's work inspired many prominent urban theorists, including Christopher Alexander and Gordon Cullen (see Sections 3.3 and 3.5), who adopted many urban morphology analysis techniques.

These techniques would come to the fore in 1956 when Harvard University began hosting a successful series of Urban Design Conferences, which focussed on the study of traditional urban forms, and were attended by many of the key thinkers of the era, including Jane Jacobs and Lewis Mumford. As this interest spread, universities in both the UK and the USA began teaching urban design courses. In an interesting parallel with the urban morphology movement, Madanipour (1996, p.103) notes how these new urban design courses, *"...show similar emphases on the relationship between physical fabric of the city and the processes which shape it."*

Despite the publication of his ideas some years later, Gordon Cullen is the first significant urban design theorist of the Urban Form paradigm. Cullen was a former architectural draftsman who, inspired by historic building arrangements, advocated an approach based upon "gateway" views of the urban setting; he called this approach and his first publication on the subject, "Townscape" (1961). The success of urban space is judged by its ability to provide a series of attractive and picturesque views, composed of built and natural elements. Cullen's work is a beautifully illustrated and evocative study of the "natural city", functioning more as a work of art and historic observation, than as a piece of design theory or guidance.

[6] Translated from Latin and loosely meaning spirit of the place.

In the UK, Cullen's "Townscape" inspired early urban design guidance, in particular the "Design Guide for Residential Areas" [7] (Essex County Council, 1973); the guide advocated traditional and vernacular buildings and arrangements, through 'gateway' views. (Goodey, 1998). At its time of publishing, it drew both criticism and praise (Harding, 1978; Wilson, 1978), but it remains incredibly influential as a way of promoting design conformity (Cullingworth and Nadin, 2006).

Figure 2.2 – A series of views from Cullen's Townscape

(Source: Cullen, 1961)

Madanipour (1996, p.45) distils much of the criticism of Cullen's work and its limitations, commenting that:

[7] Commonly known as the Essex Design Guide.

"The reduction of urban experience to only one of its aspects, the visual experience, can hardly satisfy us in our search for an analysis that entails a use of more than one sense."

Townscape is a celebration of the art of composition in urban design. Despite the obvious limitations of the approach, the critical significance of representing the space from the perspective of the people that used them would be important to urban design practice in the late 20th and early 21st Centuries.

Perceptual and Behavioural Design

This approach to urban design shared much with the urban form paradigm; both sought to oppose Modernist theories of urban planning through an understanding of context, but this new paradigm would be rooted in behavioural geography and informed by an empirical base in psychology and the social sciences. Whilst first manifest during the 1960's, the origins of this paradigm can be traced to the Chicago School of urban sociology during the 1920's and 30's. Led by Robert Park and inspired by developments in the understanding of ecological systems, the School explored new ways of conceptualising the city, its inhabitants and their way of life (Knox and Pinch, 2009).[8]

The publishing in 1938 of *"Urbanism as a way of life"* by another member of the school, Louis Wirth, was particularly significant to urban design.[9] At the heart of this

[8] Park (1916) described the city as *"mosaic of little worlds",* and as a *"social organism"*; an approach known as "human ecology", influenced by Darwin's work on evolution, and utilisng ecology inspired terms such as invasion, dominance and succession to describe urban phenomena (Knox, 1987).

[9] Building on Park's human ecology, Wirth's conceptualization of the city was based upon the human experience. Against a backdrop of an increasingly industrialized, dehumanized and often crime-ridden urban environment, Wirth argued that city life was damaging to people, proposing that the combination of increased population, density and heterogeneity, altered individuals behaviour,

was an implicit understanding that the urban environment influences its inhabitants. From this conception, Knox (1987, p.84) describes the emergence of "design determinism", exploring the negative effects of architecture and urban design on individual's behaviour:

> *"... the design and configuration of buildings and spaces sometimes creates micro-environments which discourage 'normal' patterns of social interaction and encourage deviant behaviour of various kinds. A considerable amount of behaviour has been accumulated in support of this idea."*

Foremost amongst those considering the role of design determinism, was Oscar Newman, who in the 1970's published "*Defensible Space*"; a guide to using urban design for crime reduction. Based on his observations of crime-ridden, modernist housing projects, such as the infamous Pruitt-Igoe in St. Louis, Newman argued that there had been a loss of social control in urban society. In particular, he identified public spaces as problematic, with no-one willing or able to supervise or defend them (Knox and Pinch, 2009).[10]

Despite criticism of the statistical and empirical basis of Newman's work (Broadbent, 1996), as well as the poor results of its practice (Ellin, 1999; Minton, 2009), it has been highly influential and has inspired a key area of crime reduction/urban design research: Crime Prevention Through Environmental Design (CPTED). Interestingly,

---

making them more brusque and impersonal, as a means to cope with this new 'inhuman' environment (Knox and Pinch, 2009).

[10] Newman (1973) proposed broadly four ways to make spaces 'defensible' through design:

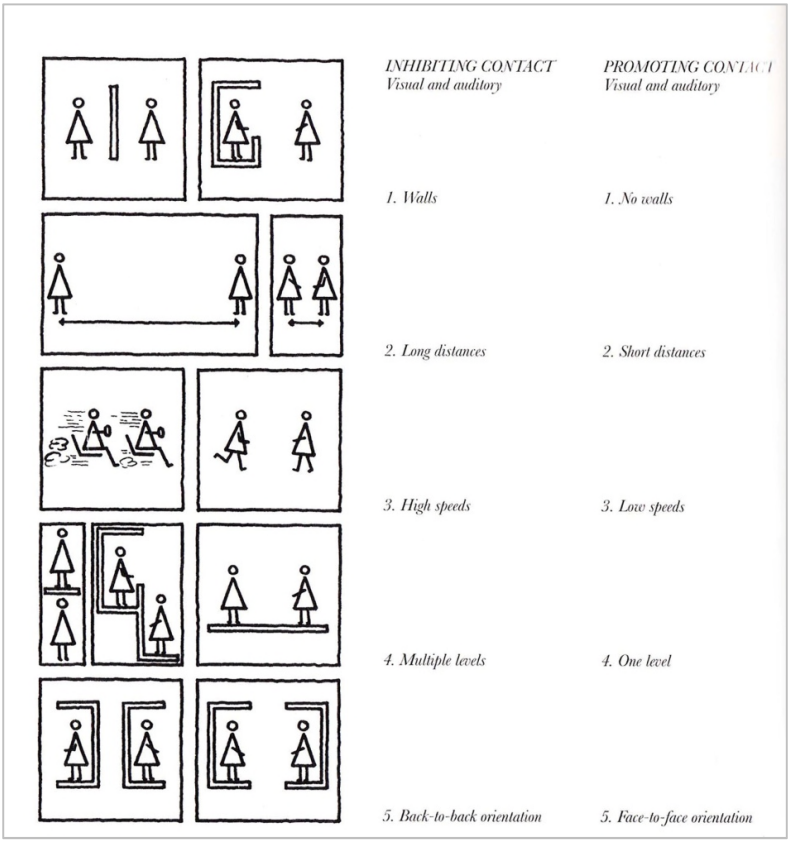
I. Territorial definition – make residents responsible for distinct areas.
II. Natural surveillance – position windows to overlook space.
III. Control entrances – making it possible to detect strangers.
IV. Sympathetic locations – position residents adjacent to compatible land-uses.

Coaffee (2009) observes how in the post 9/11 world, Newman's theories are again at the centre of thinking for many secure design initiatives, as the debate over proportionate security measures in urban design continues to evolve.

It could be said that like Newman, the deterministic quality of design was key to the work of Danish architect and urbanist, Jan Gehl, who is credited with the transformation of Copenhagen city centre between 1961 and 1995 (Gehl, 1987; Montgomery, 2013). However whilst Newman saw urban design as a tool to limit undesirable behaviour, Gehl argued that the primary purpose of it is to create *"Life Between Buildings*", which is also the title of his 1987 book on the topic. Informed by developments in psychology, Gehl argued that the social processes of the city could be enhanced through the creation of a more human urban scale built environment; see Figure 2.4, below[11].

[11] Gehl's interest in psychology is perhaps unsurprising, given that he is married to a psychologist (Montgommery, 2013).

Figure 2.3 – Illustrations from "Life Between Buildings: Using Public Space"



Source: (Gehl, 1987)

As the figure above demonstrates, Gehl's writing provides some simple design rules and typologies that can be easily utilised without necessitating wider scale planning interventions. As Punter (2007) notes, Gehl was particularly influential on the UK's Urban Renaissance, with the transformation of Copenhagen a widely copied exemplar (Montgomery, 2013).

A similar need to understand the influence of urban form and its impact upon individuals could also be said to be the key motivation for the urban design theorist, Kevin Lynch. Lynch is the most significant theorist of the Perceptual and Behavioural design paradigm, and arguably the most important urban design theorist of all.

Accordingly, the publishing of Lynch's, *"The Image of the City"* (1960) marked a turning point in the development of urban design practice.

Lynch was an experienced architect and planning practitioner, whose writing aimed to pass on his methods and experience to likeminded professionals. Whilst Lynch was influenced by the study of urban form, his techniques were based on design deterministic concepts and behavioural geography (Knox and Pinch, 2009), utilising mental map techniques to understand how the city was visually understood by its inhabitants.

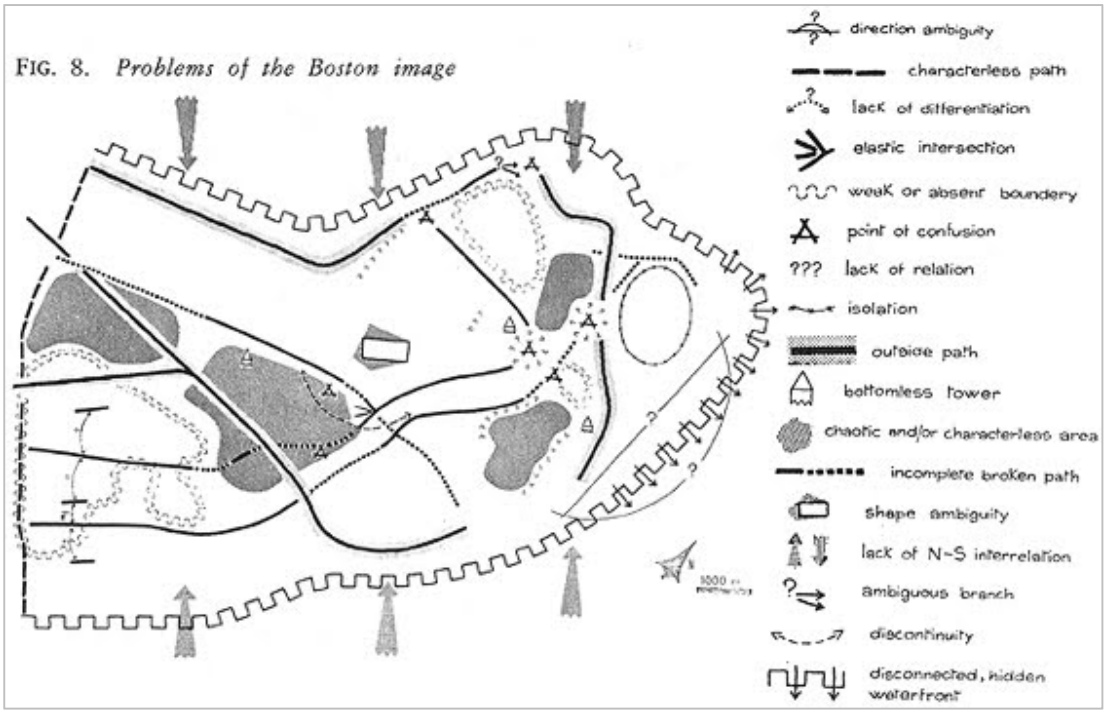
Lynch (1960) proposed that there were five key elements of urban form: paths, edges, districts, nodes and landmarks; and that these should be used by designers as the basis of new urban design strategies. The end result of this process was termed "legibility" Lynch (1960), which he described as the most important characteristic for urban life; in essence, the ease with which individuals can understand their surrounding urban form. To put this into context, Lynch (1960, p.119) elaborates how:

> *"...the spatial organisation of contemporary life, the speed of movement, and the speed and scale of construction, make it necessary to create large-scale imaginable environments. "*

Lynch's approach of survey and analysis informed design has been extensively used in the field of urban design and is incredibly influential amongst designers and policy makers as a means to inform designs; typically referred to as, "Lynchian analysis"

(Madanipour, 1996; Cuthbert, 2007, Inam, 2011). Figure 2.3, below, shows Lynch's analysis of central Boston, Massachusetts, and is reminiscent of Cozen's work.

Figure 2.4 – "Lynchian" analysis of Boston



(Source: Lynch, 1960)

As Cuthbert (2007) noted, it is difficult to critically analyse the work of Lynch given its origins in his hands-on experience and observations of practice. It could be said that Lynch's methods offer a somewhat proscriptive approach to design, that could lead to standardised assumptions and corresponding fixed design solutions. More critically, whilst Lynch did use detailed interviews with residents as an empiric base for his work, it has since been noted that this very small sample was almost exclusively with middle-class interviewees (Knox and Pinch, 2009), undermining the veracity of his claims. As Madanipour (1996) argues, this failure to acknowledge how

different social groups view the city illustrates the wider limitations of Lynch's work, which attempts to reduce all urban processes to a measure of the visual.

However, despite this lack of empirical rigour, Lynch's urban design approach chimed with the era's wider mistrust of planning, including Jane Jacobs and the pluralists; appearing to offer a more contextual and person centred approach to urban development than that offered by the era's planners. Moreover, his methods provide an almost scientific formula for measuring, informing and eventually designing urban form that is universally recognised by designers and decision-makers.

Whilst new deterministic design tools continue to be developed, most notably around the concept of 'space syntax'[12]; none have had the same impact as Lynch. The enduring influence of Lynch is still visible today, with forms of 'Lynchian' analysis "institutionalized" into the practice of urban design through influential guidance and publications and as a rationale for spatial organisation (Madanipour, 2006); see section 2.4. Where Lynch provided a rationale for urban design initiatives, the work of Gehl shaped the eventual form of public spaces.

[12] 'Space syntax' is perhaps the most extreme end of the Environmental Determinism paradigm. Citing the work of Smith (1977), Knox (1987) suggests the composition of buildings and spaces create "syntax", which stimulates a conscious and unconscious response in individuals. Using understandings of perceptive geometry, Hillier and Hanson (1984) argue that this effect can be harnessed positively, to encourage greater movement and interaction. However, Cuthbert (2007, p.219) is less convinced by space syntax, commenting that whilst the approach has some empirical basis, it is undermined by requiring "doctoral level mathematics to understand them", making it highly unsuitable for application by built environment professionals. Further, this quantitative approach sits uncomfortably with the creative and subjective approach typically used by designers.

Postmodernism

The term Postmodern carries a variety of often contrasting meanings, references and understandings, from simply the era that followed Modernism, to more complex cultural trends and post-structuralist philosophies (Allmendinger, 2001). In terms of urban design paradigm, it refers to an era of paradoxes, rationalism and romanticism in equal measure, a move from formal planning to pluralism, from a city wide perspective to individual development scale, and an interest in historic form, appearance and artifice which began to appear from the 1970's onward.

In not wholly positive terms, David Harvey (1989b) suggests that what large-scale urban planning was to Modernism, so urban design is to postmodernism; focussing on smaller, more fragmented developments that create a *"collage"* of often disparate uses. Whilst Harvey's observations appear accurate, it could be positively argued that urban design utilises smaller-scale interventions that are particularly valuable within a fast-changing, urban context, but as he implies, this shift away from formal planning during the 1960's and 70's, would be significant (Allmendinger, 2002; Healey, 2006). In response to the inadequate consultation of modernist planning policies, planners such as Davidoff (1965) and Arnestein (1969) proposed that their primary function was to enable citizen participation in development and to promote social justice; commonly known as "pluralism" (Allmendinger, 2002). However, as planners moved away from affecting the actual composition of built elements, the involvement of urban designers would be increasingly vital to fill the gap between the needs of the wider city and individual developments (Ellin, 1999; Brown, 2008).

In urban design theory, Ellin (1999) proposed that the most visually striking swing to romanticism from the rationalist perspective of Modernism, was the neo-rational European approach; citing architect Leon Krier, as the foremost proponent. Krier's own version of "neo-rationalism" was derived from the classical traditions of the renaissance, based on considerations of urban form and exclusive of social context (Ellin, 1999). Krier himself (1998, p.XX) outlines his view of urban design:

> *"What is essential in this art is not so much the beauty of ideas but the beauty of the result, of what the naked eye can see from the detail of the whole, without preparation or explanation of any kind."*

Somewhat ironically, Krier's work is about a personal aesthetic vision, rather than attempting to understand the people who will use his designs, much like Le Corbusier before him. However, Krier's designs, principally realised in books such as 2007's, "Architecture: Choice or Fate", are incredibly alluring, attractive and appealing, and would be a significant influence on the New Urbanism (see below) and in the neo-traditional design of Poundbury, Dorset.

There are a number of other variations of neo-traditional urban design approaches, but their fantasy urbanism has little but appearances to offer the social, economic and cultural problems of today[13]. Other notable urban thinkers of the postmodern paradigm included Robert Venturi and Denise Scott Brown; their architecture practice and writing, such as *"Lessons from Las Vegas"* (1972,) celebrated the ordinary, the ugly and the banal, as opposed to the 'heroic' and 'original'

[13] Ellin (1999) and Broadbent (1996) identify "neo-classicalism" as a similar approach to "neo-rationalism" with nuanced differences, as displayed by Aldo Rossi and Charles Moore, designer of the Piazza d'Italia.

architecture championed elsewhere. Taking inspiration from gas stations and motels, they conceptualised the city as a semiotic system of communication, where form was largely irrelevant.

However, the paradigm is also notable for a key urban design theorist; the architect and academic, Christopher Alexander. In contrast to Krier or Lynch, Alexander's theories are more opaque and difficult to elaborate, but it could be suggested that his principles are based on the belief in a universal truth, order and beauty, which is reflected in the unity and order of the "natural city". In echoes of Mumford and the human ecologists of the Chicago School, Alexander (1987, p.2) states:

> *"When we look at the most beautiful towns and cities of the past, we are always impressed by a feeling that they are somehow organic."*

Alexander (1987) was a keen scholar of urban morphology, later publishing papers on the subject, which would inform his assertion that the role of each new development was to 'heal' the ills of the city, which is a growing whole'.

Alexander endorsed Lynch's techniques for urban analysis and was a strong advocate of contextual approaches, being also opposed to formalised planning strategies. Critically, his work is incredibly popular amongst urban designers, planners and architects (Cuthbert, 2007); in particular his best known publication, "The Pattern Language" (1977). The aim of this book was to provide "patterns", in effect wide-ranging, generic solutions to resolve recurring design issues, which break down

complex problems into a series of manageable steps[14]. It could be deduced that the success of the approach comes from the provision of exemplars, inspirations and simple design solutions, which can be used flexibly, dipped in to and out of, and doesn't actually necessitate the user buying into any wider theories at all; very postmodern.

In common with Alexander, the era was also notable for a wider shift away from formal planning, with no lesser minds than Peter Hall and Cedric Price advocating "Non-plan", a radical approach which suggested the removal of planning restrictions (Banham et. al., 1969); in itself a tacit admission that the era's urban environment couldn't be much worse without planning.

Post-urban

This reduction of formal planning is key to the Post-urban paradigm, which was also marked by a corresponding lack of cohesive urban design theories or interest in urban context, exemplified by 1980's development.

In Allmendinger's (2002) estimation, public planning and design strategies were identified as an obstacle to *"free enterprise"* by proponents of neo-liberal economics, such as the Governments of the UK and USA. They further argued that in the absence of such controls there would be greater economic development, whilst Punter (2010, p.343) notes how in 1980 the UK Government negatively labelled design guidance as, *"aesthetic control".*

[14] Perhaps paradoxically, Alexander is also an influential expert on computer science, perhaps the most rational of mediums, and his pattern language has been proposed as important to the adoption of "smart cities" (Townsend, 2013).

The ultimate expression of this approach was the “enterprise zone”; inspired by the “non-plan”, which allowed private developers to shape the form of an area, without state controls (Barker, 1999). Interestingly, Hayden (1994) suggests that the earlier promotion of pluralism and advocacy planning, created the policy vacuum whereby the physical development of cities was solely controlled by economic interests. With design and implementation almost exclusively in the hands of private developers (Hall, 2002), Sennett (1990) describes how areas of the city were increasingly configured as spaces of consumption, homogenized and closed off from sources of difference in the name of safety and security[15].

Ellin (1997, p.44) also directs blame for this situation at the architects of this era; in particular, for ‘giving up’ consideration of social concerns or wider city building. Elaborating on Ellin’s theme, Koolhaas (1995, p.495) somewhat ambiguously described a trajectory in architectural theory and practice from the beginning of the 20th Century with the development of skyscrapers, to globalised, mega-developments and an architecture of *“Bigness”,* which he suggests is the “*ultimate architecture*”. Koolhaas (1995, p.509) further asserts that this movement towards “Bigness” has no theoretical underpinnings, it is simply a pursuit of "*what is the maximum architecture can do?*"

Others have suggested that this trend has close associations to architecture as marketing and *“boosterism”* for prestige and investment, with little consideration of surrounding context (Moore, 2012; Soja, 2008). In crude terms, Koolhaas (1995,

[15] In echoes of this, Flusty (1997, p.48-49) identified 5 types of “interdictory” spaces, designed specifically to repel unwanted groups or individuals from parts of the city, whilst Newman’s idea of Defensible Space, was also widely implanted.

p.502) describes an approach where individual works of architecture ignore, compete and in many cases attempt to supplant the wider city:

> *"Together, all these breaks - with scale, with architectural composition, with tradition, with transparency, with ethics - imply the final, most radical break: Bigness is no longer part of any urban tissue.*
>
> *It exists; at most, it coexists.*
>
> *Its subtext is fuck context."*

Koolhaas has since located these phenomena as part of a wider, "post-urbanism" (Sorkin, 2011). The resultant poor quality of the urban realm and the disengagement with the social and physical context of the city, is the critical characteristic of the Post-urban paradigm, with the 1980s and early 1990s characterised by out-of-town growth, urban decline and increasing fear of crime, which saw the flight of the middle classes away from urban centres (Hall, 2002; Ellin,1996; Morphet, 2011).

Urban Renaissance

Inspired by the neglected state of cities on both sides of the Atlantic, the late 1990s and early 21st Century saw an international upsurge of interest in the field of urban design, accompanied by major redevelopments and initiatives to improve the urban environment (Ellin, 1999).

The paradigm would be one where urban designers came to the forefront of new developments, as cities shifted from being a location for urban *"problems"* (Healey, 2002), to their quality of place being of critical importance to economic growth

(Florida, 2005). Writing at the launch of new, "*Journal of Urban Design*," Oc and Tiesdell (1996) describe the mounting relevance of urban design to a range of contemporary concerns, as well as its critical role co-ordinating and mediating different elements of urban development.

In the USA, this was expressed by the emergence of New Urbanism (NU), a highly significant built environment and design movement, developed during the late 20th Century to address the perceived problems of urban decline and suburban sprawl, utilising earlier urban design theories, most notably those of Christopher Alexander (Kunstler, 1993; Madanipour, 1996). The movement has its origins in the anti-modernist polemics of Jacobs, Mumford and Kunstler[16], advocating a nostalgic return to historic, pre-industrial urban form, and incorporating mixed-use, compact, walkable neighbourhoods with a traditional approach to urban design (Leccese and McCormick, 2000; Congress for the New Urbanism, 2001).

Whilst NU does draw on the work of some prominent academics, it is principally led by practitioners including architects, Andres Duany and Elizabeth Plater-Zyberk (Broadbent, 1990). Their design for Seaside, Florida, initiated in 1981 with Leon Krier acting as a consultant, is widely considered to be a pioneering development for NU (Ellin, 1996; Madanipour, 1996). Seaside was developed through a "transect"[17], building codes (the so-called "Smart Code") and masterplan.[18]

[16] James Howard Kunstler is an American author and social critic, most notable for his 1993 publication, "The Geography of Nowhere"; a scathing review of American urban planning and resultant urban sprawl in the 20th Century.

[17] The "transect" describes a cross-section illustrating the critical path of development, identifying different development zones.

[18] The Smart Code, which reads more as a collection of detailed urban design criteria, is still publicly available online and has been used as the basis of many other developments, including the Hulme district of Manchester (Madanipour, 1996).

Given the involvement of Krier, it is perhaps unsurprising that the approach mirrors his "neo-rational" principles; in particular the formula for development is not driven by a conventional town planning strategy, rather it is based upon the form-based principles of urban design, intended to achieve a romanticised traditional appearance.

However, despite popular and commercial appeal, NU attracted significant criticism for being *"kitsch"* and *"escapist"* (Ellis. 2002) or for its, *"Disney version of urbanity"* (Sorkin, 2011, p.290). Perhaps most damming are the accusations that NU developments lack social inclusivity and are closely associated with neo-liberal urban policy (Harvey, 1989a).

In echoes of Sennett's earlier comments, Waldheim (2010, p.22) also questioned the objectives and outcomes of both urban design and NU in urban planning:

> *"I would argue that urban design ought to concentrate less attention on mythic images of a lost golden age of density and more attention on the urban conditions where most of us live and work. ...far too much of the main body of mainstream urban design practice has been concerned with the crafting of "look and feel" of environments for the destination consumption by the wealthy."*

Defenders of NU argue that the movement has helped to reverse the North American trend for urban sprawl (Ellis, 2002). From a UK perspective, Punter (1996) praised its level of community consultation and engagement. NU offers a practical and pragmatic approach to urban development, which does not seek to challenge

the dominant, neo-liberal economic model, but provides designers and developers with simple principles to implement.

In the UK, Urban Renaissance was the name initially given to a series of policies, proposals and initiatives which aimed to regenerate Britain's cities, but more recently it is used to refer to the massive surge of UK urban development and city regeneration seen during the late 90s and early years of the 21st Century (Punter, 2011). Whilst the UK's urban renaissance had much in common with the United States' NU, the transformative focus was more on brownfield sites and urban centres, than the suburban American approach (Hall, 2002).

The policy began with the formation by the New Labour Government of the Urban Task Force (UTF) , who published their findings as, *"Towards an Urban Renaissance"* (1999), which offered a way to tackle urban decline based on design excellence; promoting good urban design, better quality public realm, sustainability and European-influenced, best practice.

Urban design would perform the critical role within urban planning policy and implementation, forming common ground between the work of private and public sector actors (Punter, 2011). However, Punter (2011, p.1) suggests that although the UTF, "*gave a massive boost to the urban design"*, this was tempered by the difficulties of local decision makers and planning officers determining what constituted "good design" (Cullingworth and Nadin, 2006), further compounded by a lack of appropriate urban design guidance (Carmona, 1996).

Publications, by the newly formed Commission for Architecture and the Built Environment (CABE), would attempt to address this problem. The first and perhaps most influential, is *"By Design - Urban design in the planning system: towards better practice"* (DTLR, 2000), and which proposes that the 'objectives' of Urban Design are:

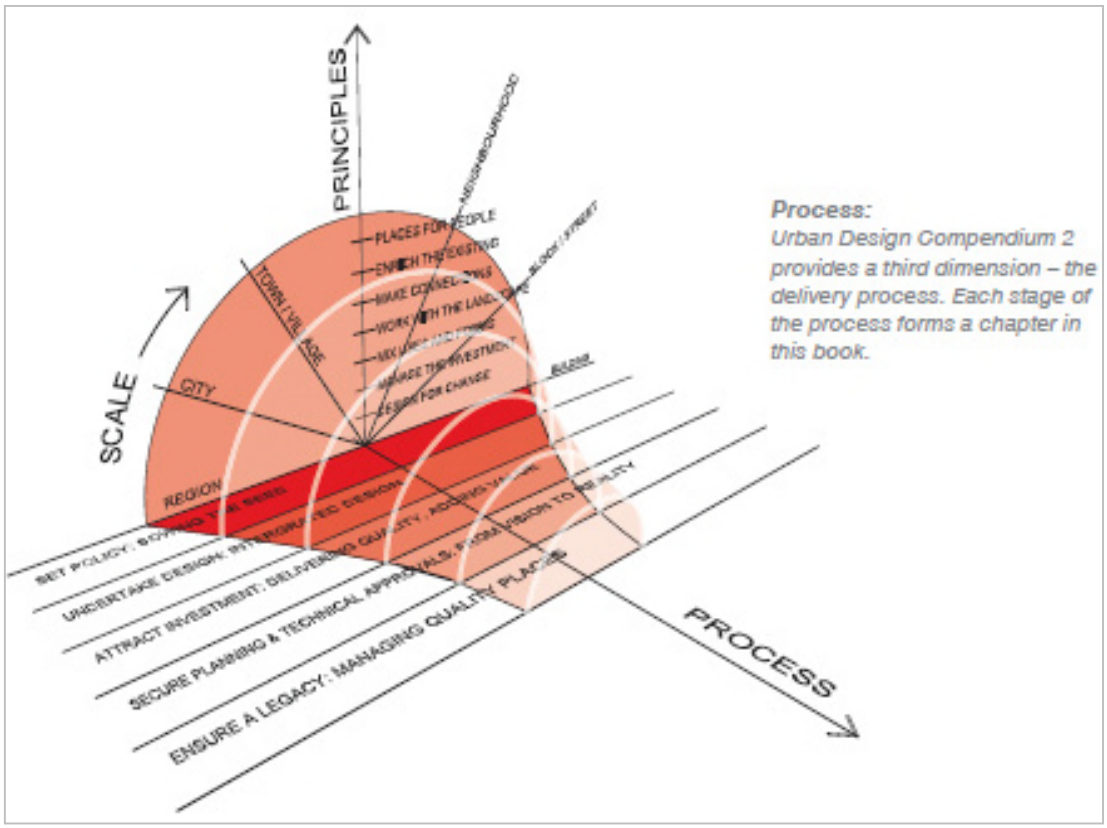
- *Character*
- *Continuity and Enclosure*
- *Quality of the Public Realm*
- *Ease of Movement*
- *Legibility*
- *Adaptability*
- *Diversity*

In effect, these objectives function as practical performance indicators, inspired by the work of Lynch, as well as other urban theorists including Alexander and Gehl. "*By Design"* is a helpful and informative guide for small to medium scale design projects, based on a contextual approach with examples and exemplars. Interestingly, it also recommended more public consultation. Whilst fairly prescriptive in terms of form, the outcomes can be vague; e.g. just how do you define character? One potential consequence was that it could allow designers and developers a relatively free hand, provided that they demonstrated or perhaps post-rationalised, their proposals to *By Design*'s criteria. Like the Essex Design Guide before it, perhaps the real priority of *By Design* was to inform planning officers about urban design, rather than to provide design standards, *per se.*

Also influential at the time was the "*Urban Design Compendium"* (2000), produced by the Government development quango, English Partnerships[19], which offered a very wide-ranging and pragmatic guide to new developments using urban. Later National guidance, such as the Department for Transport's, "Manual for Streets" (2007) would focus more on wider placemaking activities, including the creation of 'homezones', which studies have shown to aid regeneration, improve perceptions of safety, increase on-street play, social interaction and resident happiness (Clayden et al., 2006). Perhaps the best guidance of the era was the updated Urban Design Compendium 2 (UDC2) (English Partnerships, 2007) which proposed an integrated and collaborative approach to place making through urban design, and was extremely comprehensive. Figure 2.5, below shows a diagram of the proposed process.

[19] English Partnerships (EP) was the national regeneration agency for England, responsible for land acquisition and assembly and major development projects, alone or in joint partnership with private sector developers. In 2008 it was merged into the Homes and Communities Agency (HCA).

Figure 2.5 – UDC2 Development Process



(Source: English Partnerships, 2007)

It provided a detailed, step-by-step guide to urban design from concept to management, interspersed with impressive exemplars that highlight the importance of learning from practice.[20]

Despite the great pace and scale of redevelopment, the period also witnessed widespread frustration at the UK Government's failure to put their earlier promises into action, focusing instead on city competition and economic priorities (Cullingworth and Nadin, 2006; Morphet, 2011); most notably there was stinging criticism from the UTF (2005). More widely, there has been much academic criticism

[20] Unfortunately, UDC2 has the look of a draft document and was probably published at just the wrong time, being the end of a boom and prior to a change of government, to make a significant impact upon practice.

of the Urban Renaissance and the UTF reports they derive from, in particular their fundamental belief that high-quality design alone can have significant social and societal benefits; the comments of Ravetz (1999) (cited in Punter, 2011, p.279), elaborate this well:

> *"...much as I savour good design... history reminds me that environmental quality is the result rather than a determinant of a well functioning society."*

The approach drew further criticism for the lack of empirical evidence supporting design-led initiatives (Bell and Jayne, 2003), the unpopularity of much high-density development (Senior et al., 2004) and the lack of local authority planning and design leadership (Punter, 2010). Perhaps the most eloquent explanation of this problem is offered by Moore (2012, p.241-242):

> *"Developers became mini-mayors, deciding the shape of whole neighbourhoods, with homes, shops, public spaces, and even schools as well as offices. They also spent ever-increasing amounts on hiring planning consultants, people skilled in manoeuvring proposals through the many committees and panels that determined the fate of a planning application. In another universe these consultants could have been employed by public authorities to exercise foresight, paid for by a portion of the lavish sums actually spent on the unproductive work of massaging and manipulating the systems. But that would be too sane."*

The urban renaissance paradigm ground to a halt with the 2008 credit crunch, alongside a host of other urban initiatives and redevelopment projects. The period

saw significant changes to the composition of cities in both the UK and USA, with a corresponding increase in profile for urban design. However, the critiques of Punter and other academics suggest that concentrating on the built form alone, without addressing the underlying social considerations, was not enough to create successful places and communities. On both sides of the Atlantic, the significance of good governance for successful urban design was all too apparent.

Ecological and Integrated

In the wake of stalled urban development across the globe there has been a period of critical reflection on urban theory, and in particular discussion of the short-comings of conventional urban design approaches (Waldheim, 2006; Corner, 2006; Sorkin, 2011), with widespread efforts to overcome the, *"stalemate in the urban design professions"* (Ellin, 2006). Accordingly a new paradigm, or paradigms, have emerged promoting considerations of time, process and the role of communities, which learns from the proving ground experience of urban renaissance.

The critical stimulus for this paradigm is Ian McHarg 's 1969 publication, *"Design with Nature"* (Barnett, 2011); advocating a fusion of urban design and town planning, with ecological and geographical understanding, it has become increasingly relevant as designers seek to find more sustainable approaches to development. McHarg was influenced by the "human ecology" of the Chicago School, as well as the traditions of North American landscape architecture[21]; accordingly, his critical contribution was an understanding that man and cities exist in a state of dynamic balance with the natural environment, and thus designers need to understand and work with these

[21] Such as Frederick Law Olmstead's design for New York's Central Park.

environmental processes including erosion, geological features, patterns of vegetation growth and hydrology. Particularly important was his work on the mapping of floodplains and using it to guide suitable land uses, which Barnett (2008) suggests was the forerunner of graphical information systems (GIS).

McHarg's work is not without criticism; Glaeser (2012) suggests that whilst his ideas promote 'greenness', this does not necessarily equate to sustainability. However, Barnett (2011, p.11) succinctly summarises the significance of McHarg's methods to this study:

> *"...he pointed out that failure to work within the constraints of natural systems invited retribution: landslides, flood, subsidence of buildings. ...More recently, as the natural environment has proved to be a much more dynamic system than even McHarg had envisioned, designing within the constraints of natural systems has become understood as essential for sustainability, both for slowing down or stopping climate change and for adapting to the new situations climate change produces."*

McHarg's approach would provide the critical inspiration for the 'so-called' Landscape Urbanism. Foremost proponent of Landscape Urbanism, Charles Waldheim (2006, p.15), is notable for his criticism of urban design conventions and argues that public landscapes can be used to provide infrastructure and organization to urban form, based upon a bottom-up paradigm. It is the proponents' contention that this 'realignment ' allows a consideration of urban form that is not static or based upon fixed forms, but rather identifies the urban setting as a changing

medium, much like the natural world. When reflecting on the High Line[22] in New York, designed by James Corner and to date the most high profile Landscape Urbanism project, Moore (2012) supports how its understanding of time and the processes of human use and plant growth, are key to its success.

This observation mirrors many qualities of Ellin's "Integral Urbanism" (2006), which seeks to move urban design from ideals of function (as in modernism) or historic forms (as in postmodernism), to one based upon ecological and technological models. The approach promotes five key "Qualities": hybridity, connectivity, porosity, authenticity and vulnerability, which have interesting parallels with conceptions of social-ecological resilience (see Chapter 4). Ellin (2006, p.XXI) states the importance of this approach:

> *"As ecological success is measured by the capacity of our planet to support all life forms, urban design success should be measured by its capacity to support humanity."*

With the exception of the High Line, this emerging paradigm remains largely untested. However, the approach raises new qualities and considerations for urban design theory and practice.

2.4 THE PRACTICE OF URBAN DESIGN

The contemporary practice of urban design is increasingly shaped more by policy priorities, economic, political and social pressures, than earlier theories or

[22] The High Line is a linear park on an elevated section of disused New York railway. Following the completion of the first section in 2009, the scheme has received many visitors and plaudits, whilst also being widely credited for regenerating the neighbourhoods it passes through (Moore, 2012).

paradigms. Thus the intention of this penultimate section is to reflect on the current practice of urban design, expand upon the key processes and broaden the consideration of the topic beyond the main body of theory and implementation expressed within the paradigms.

Brown (2008, p.76-77) provides a summary of the role and purpose of urban design, encapsulating many of the critical points raised in previous sections:

> *"For me, the essence of the urban design approach is that it concentrates more on relations between objects, more on linkages, contexts, and in-between places, than on the objects themselves. It deals with long time-spans, incremental growth over time, decision- making that is complex and fractionated, and relations between different levels and types of decision-making. Urban design is the subtle organization of complexity, the orchestration of sometimes inharmonious instruments, the awareness that discord at a certain level can be resolved as harmony at another."*

Building upon this, Oc and Tiesdell (1996, p.5) proposed that urban design has a wider significance for the built environment, as a practice that intersects and provides an "interface" with other professions and disciplines, offering opportunities for holistic approaches. Others have noted that the first school of urban design was established at Harvard as a *"transdisciplinary space"* (Waldheim, 2008, p.227), although as Talen (2008, p.183) observes, the practice has largely been dominated by the *"bad parenting of architects."* In parallel to this, 'siloed' local government procedures have often struggled with the collaborative technical, social and

economic considerations of urban design, typically employing specialist urban design officers to produce aesthetic guidelines (Brown, 2008; Punter, 2010).

In the current era, having taken a long time to establish itself, urban design practice is now *"public policy"* and part of planning's *"regulatory system,"* as the result of *"imperatives of 'the entrepreneurial city' and by urban competitiveness strategies"* (Punter, 2007a, p.167-169). As such, urban design codes and standards are increasingly driving urban form and development (Ben-Joseph, 2005). More specifically, Punter (2007b, p.375-376) argued that in an era of *"weakened planning controls"* and *"neo-liberal ideologies",* urban design has taken on an 'inflated' role in urban policy to deliver new spaces for consumption and iconic architecture and is diminishing as a force for social and environmental good. He is also highly critical of the widespread lack of urban design skills.

These reflections echo the writings of American architect, critic and theorist, Michael Sorkin (2011, p.287), who has been scathing about urban design as it is typically practiced:

> *"Urban design has reached a dead end. Estranged both from substantial theoretical debate and from the living reality of the exponential and transformative growth of the world's cities, it finds itself pinioned between nostalgia and inevitabilism, increasingly unable to inventively confront the morphological, functional, and human needs of cities and citizens."*

The crux of Sorkin's (2008, p.166) argument is that despite *"continuous remodelling of paradigms for the form and elements of the modern good city,"* urban design is at

an impasse between a 'post-urban' non-design and a superficial ordering of architectural elements for economic boosterism and place marketing. Moreover, he has argued that the work of Kevin Lynch and other urban theorists has been subverted from its social origins towards the production of homogenous architectural typologies. Whilst this is clearly a US-centric perspective, there is a wider consensus that urban design practice is too often about idealised appearances for commercial interests and that there has been an overlooking of social factors (Waldheim, 2008, 2010; Sommer, 2008; Sorkin, 2008; Punter, 2007a, 2007b; Greenburg, 2008). Within this context, Sommer (2008) argues that the 'political art' of urban design needs to be rediscovered, as a means to encourage greater community engagement.

Urban Design as Process

If we consider urban design as a collaborative space for engaging and brokering different professional understandings and perspectives, rather than rules and standards for idealised urban form, the 'processes' which drive urban form take on a critical importance. Accordingly, Palestinian architect and academic Omar Yousef[23] (2011), illustrates how these deeper social processes are embedded into urban form:

> *"Urban landscapes and city morphology are social products that reveal and reproduce society's power structures as well as cultural and political values; they evoke moral judgments."*

[23] Yousef's work describes how political strategies of control and oppression are contained with the urban fabric of Jerusalem where he lives and works. Conversely, Allen (2006) suggests that our built environment has an "ambient power", which can foster greater social interaction.

This idea echoes the writings of Ali Madanipour (1996, p.3), who argued that urban design, as currently practiced, is principally about the approach or the product; rather it should be seen as a *"socio-spatial process."*

Madanipour (1996, p.xi) further elaborates:

> *"As it is rooted in political, economic and cultural processes and involves a number of agencies interacting with socio-spatial structures, urban design can only be understood in its socio-spatial context. From this perspective, the technical, creative and social elements of urban design all come together to provide insight into this complex process and its products."*

There is a certain irony that in looking for contemporary reflections on best practice, the study should take inspiration from nearly a century in the past, but Louis Wirth's (1938) seminal, "Urbanism as a way of life", uses the term "urbanism" to encapsulate all urban factors and processes, including those that have been neglected within contemporary practice[24]. Perhaps tellingly, Wirth (1938, p.4) foretold many of the problems and social tensions, that 70 years of urban design theory has consistently struggled with:

> *"As long as we identify urbanism with the physical entity of the city, viewing it merely as rigidly delimited in space, and proceed as if urban attributes abruptly ceased to be manifested beyond an arbitrary line, we are not likely to arrive at any adequate conception of urbanism as a mode of life."*

[24] Lefebvre (2003, cited by Mould, 2014) is less enthusiastic about the term urbanism; suggesting that it describes an indeology where citizens are subdued as a means to encourage consumerist capital.

More recently, Carmona (2014) has provided an update of these conceptions, suggesting that urban design is part of a continual process (or continuum) which shapes places. This continuum is comprised of context, processes and power relationships. It takes ideas of environmental determinism a step further, suggesting that there is an ongoing dialectic between citizens and their built environment. In echoes of Waldheim and Corner, Carmona (2014, p.34) also recognises the temporal nature of the medium:

> *"…urban design represents an on-going journey through which places are continuously shaped and re-shaped—physically, socially and economically—through periodic planned intervention, day-to-day occupation and the long-term guardianship of place."*

Although there has been some notable support for Carmona's approach (Lang, 2014; Barnett, 2014), there remains a question mark over whether trained designers would wish to engage with social, political or economic factors. Further, whilst traditional design and development strategies have focussed on individual interventions or developments, this approach emphasises the importance of ongoing stewardship. Inevitably, this stewardship is dependent upon meaningful citizen engagement, which itself challenges existing governance and political arrangements related to the development of cities.

From a political perspective, whilst typologies of urban design can have political significance, as illustrated by Parkinson's (2012) suggestion that a city's public spaces' democratic role can be influenced by their design; more commonly it is the

process of urban design itself that is shaped by political processes and in particular governance.

Urban governance thus emerges as the critical factor in delivering successful or unsuccessful urban design. Adams and Tiesdell (2011) go further, contending that the design process is simply one part of a much larger process, where conventional ideas of design form the "first-order", whilst the "second-order" of this design activity is the governance and decision making activities.

> *"By setting design constraints, second-order design can give policy-makers significant influence on first-order design. Second order design is similar to planning and much contemporary governmental practice in which public managers must devise incentive systems that obtain co-operation from actors over whom they only have limited control (Salamon 2002). Effective place-making thus requires second-order design to set an appropriate context for first-order design."*
>
> (Adams and Tiesdell, 2011, p.2)

This appreciation of second-order design illustrates why any research of urban design, also needs to consider the corresponding governance and decision making arrangements. This is particularly significant within the UK at the present time, given the recent shift in design policy as part of the National Planning Policy Framework (NPPF), which notably makes no mention of urban design, in contrast to its critical role within earlier planning approaches. Furthermore, as part of the wider changes to policy that have accompanied the NPPF, in 2013 all forms of design guidance were withdrawn and replaced with a much abridged Planning Practice Guidance (PPG).

The PPG is web-based and provides minimal text-based descriptions of some generic principles for design; for example:

> *"By establishing sound, clear and easy to follow design policies and processes for use by both developers and local communities, local planning authorities can make design a more transparent and accessible part of the planning process."*
>
> (DCLG, 2014)

Given the absence of meaningful description or visual information (the PPG contains no pictures or plans), this guidance can be of very little use to designers or decision makers. The approach is presupposed on the principle that if national guidance is removed, it will be replaced with local guidance; however, earlier research has suggested that it is at the local authority level where design skills are most lacking (Punter, 2010). The subsequent empirical chapters of this thesis will explore the effectiveness of this approach in practice, through the lens of urban resilience.

New Agendas for Urban Design

The introduction to this chapter noted how urban design was identified as critical to tackling a wealth of social issues and wicked problems, whilst others have suggested that it has been instrumental in promoting specific issues, most notably sustainability measures (Punter, 2010), and increasingly resilient design (Coaffee and Bosher, 2007; Chmutina et al. , 2014; Valdes and Purcell, 2013).

As several sources have noted, urban design has been advocated as important for promoting economic growth through 'creative' and 'entrepreneurial' city approaches

(Florida, 2005; Punter, 2007a, 2007b, 2010; Sorkin, 2008; Waldheim, 2010), whilst one of the arguments behind the design-led regeneration of the urban renaissance was the economic value of urban design (Urban Task Force, 1999). Accordingly, an early CABE publication, entitled "The Value of Urban Design" (Carmona, 2001), asserted that good urban design could lead to a 15-20% increase in capital value, plus accelerate letting and sales rates, whilst good quality urban design wasn't necessarily more expensive. In practice, however, commercial developers have often been reluctant to invest in good design, perceiving that results are too long-term, given the short-term nature of their commercial interest (English Partnerships, 2007).

In explanation of this, Talen (2008, p.184) highlights the conservative culture of built environment practice and suggests that clients have *"never allowed urban design to learn from its mistakes and have another go."* Furthermore, Lang (2005) has suggested that many professions involved with urban design are insufficiently engaged with financial issues, whilst others have pointed towards the lack post-occupancy reviews (Carmona, 2014).

Pointedly, the NPPF makes a number of references to a new consideration for urban design; 'well-being' (DCLG, 2012a). Within this context, Charles Montgomery's recent publication, *"Happy City: Transforming our lives through urban design"*, offers a compelling argument of how urban design, increased social interaction and the provision of well-designed, public space can improve the health, happiness and well-being of urban residents. Elsewhere, urban design has been shown to have a role in limiting the impacts of global warming (Montgomery, 2013) and even assisting the

emergency recovery of an earthquake (Allan and Bryant, 2011). These examples highlight the almost limitless scope for urban design practice, and illustrate the problem of limiting practice to a single paradigm.

> *"The significance of urban design lies in the role it plays in the overall transformation of cities. As political, economic and cultural changes have given a new significance to cities, urban space is being reshaped to accommodate the new urban conditions. In its broadest terms, urban design is the tool of this reshaping, hence its structural significance*
>
> (Madanipour, 2006, p.191)

Most critically for this study, urban design has increasingly been identified as the potential medium for incorporating features that enhance urban areas resilience to both anthropogenic threats and natural hazards, as Coaffee and Bosher (2008, p.75) express:

> *"Recent initiatives to protect the built environment have focussed on the capability of the urban landscape, and its urban managers to both resist and recover rapidly following disastrous events."*

More widely, Dainty and Bosher (2008) have pointed out that achieving urban resilience can only happen with the assistance of a range of built environment professionals, which is not currently occurring. Coaffee (2009, p.88) elaborates and further argues in relation to counter-terrorism resilient design that:

> *"...embedding resilience in the planning and design of cities requires not just engineering and planning solutions to 'harden' buildings from potential*

attack, but also systems of governance that seek a co-ordinated effort amongst built environment professionals"

However, there is presently little practical guidance and empirically informed theoretical basis for how urban design can contribute towards urban resilience. This is a gap this thesis seeks to close.

2.5 SUMMARY

The review of urban design paradigms tells the story about how the topic has been considered, popularized and promoted in the 20th Century. Together these demonstrate how ideas of urban design, as we currently understand it, emerged as strategies for planning cities became separated from the actual process of implementing urban development, and inspired by the study of urban form and behavioural geography. More subtly, it also uncovered how the built environment professions splintered, with architecture becoming increasingly detached from the wider urban processes and social considerations, and more concerned with aesthetic building forms that promote the capital interests that are increasingly the dominant power within the contemporary city. Similarly, it is important to note how the role of urban governance shapes the implementation of different eras of urban design, and how as public urban planning was reduced to a more passive bureaucracy, the built environment sector lost its connection with the social sciences and the civil society more broadly.

Through the exploration of these paradigms it becomes clear that the evolution of urban design theory and practice is actually a series of dialectics that fluctuate between functional or romantic, old or new, the planned city or the natural city,

technical or creative, good city or bad city, stand-alone or contextual, people or places, subjective or objective, economic or social. Interestingly these paradigms often demonstrate silo approaches, psychology or social consideration, context or concept, urban design or planning; whereas more integrative approaches would seek to balance the positive aspects of each approach in a more complete manner. The emergence of a more contemporary and integrated urban design paradigm re-establishes the primacy of the social, ecological and user processes that shape the urban setting.

Finally, a review of contemporary urban design practice identified the importance of urban design as both a “transdisciplinary space” and as a “socio-spatial process”, which reflects social and environmental processes. Further, it was argued that urban design should be seen as an ongoing process of long-term stewardship, as opposed to single-point interventions, that has great potential to incorporate new agendas; most critically the need for greater resilience. By its very nature, this approach is necessitated on the engagement of a wider group of stakeholders, which once more highlights the need for governance arrangements and “second-order design,” that can promote more collaborative and holistic urban design approaches; approaches that this thesis will argue are essential for the enhancement of resilient design.

3 URBAN GOVERNANCE AND DESIGN DECISION MAKING FOR URBAN RESILIENCE

3.1 INTRODUCTION

The broad purpose of this study is to research how the material process of urban design can contribute towards enhancing the resilience of cities. How these elements are delivered in practice, is determined by governance policies, processes, decision making structures and informal networks. As Healey (2006, p.59) notes:

> *"Governance, that is, the management of the common affairs of political communities, thus involves much more than the formal institutions of government. ...the visible power of formal government decision-making arenas is always complemented by the informal and less visible ways in which power and influence is mobilised."*

The aim of this chapter is thus to review and critically assess notions of governance, and in particular, how they shape and inform the process of urban design and the implementation of the emerging resilience agenda. Significantly, Coaffee (2013, p.4) suggests that governance is itself critical to urban resilience strategies:

> *"The new governance approach to enhancing urban resilience emphasizes 'joined-up' approaches to decision-making. Whereas traditional approaches to urban risk have relied upon a narrow range of stakeholders, contemporary and future schemas hope to draw a full range of professional and community groups into decision-making at a range of spatial scales, from locally coordinated systems to centralized and sub-national organizations"*

It will also explore beyond the formal definitions of governance, and address the more multifaceted, informal processes by which urban decision making takes place in different arenas. Following this introduction, the chapter will look at how the broad concept of governance has emerged from more conventional understandings of government. A brief review of historic UK Government practices will set the context to this exploration of governance, before focussing on the shift in urban governance from *"managerialism to entrepreneurialism"* (Harvey, 1989b).

Section 3 will look at initiatives to reform government and governance practice for greater effectiveness within the UK, and as an attempt to address the failings of neo-liberal, deregulated and entrepreneurial urban governance. In particular, the study will focus on understandings of 'holistic government', how more integrated and multi-level governance were enacted under the New Labour Government (1997-2010), and the observations that can be drawn from these implemented policies. Briefly reflecting on stakeholder participation in the built environment, the study will outline how the concept of collaborative planning can be used as a frame for mediating the new consideration of resilience into the design and development processes, in addition to greater stakeholder engagement, which has been informed by the governance reforms outlined earlier. Finally, the chapter will conclude with a critique of the 'New Spatial Planning' (Haughton, et al., 2010), an approach to planning which is itself informed by the new approaches to governance, as well as considering recent planning reforms and austerity measures, enacted by the Coalition Government (2010 to 2015) and their significance to urban design and resilience practice and implementation.

3.2 GOVERNMENT TO GOVERNANCE

The purpose of this section is to consider how conceptions of governance have emerged from more conventional understandings of government, reflecting in particular on the history of UK Urban Government and exploring in further detail the period of the 20th Century where city government practices shifted from a paradigm of "managerialism" to one of "entrepreneurialism."

Conceptions of Governance

> *"The systems of governance of a society or community refer to the process through which collective affairs are managed. Governance involves the articulation of rules of behaviour with respect to the collective affairs of a political community; and of principles for allocating resources among community members."*

This quote by Healey (2006, p.206), neatly outlines the broad purpose of governance; which is to provide structure and rationale for communal decision making at a range of interlinked scales. More subtly, it also notes how governance can be expressed through 'rules of behaviour', which is particularly pertinent to resilience policies and will be explored further in Chapter 4. More generally, the way in which governance is practiced is also significant, which Rydin (2010, p.47), articulates, *"Governance is understood as a policy system in which formulation and implementation operate through networks."*

Whilst this understanding of network governance should not be considered the sole preserve of governments and could also be used to explain the decision-making

hierarchies of private companies, this study will be reflecting upon the role of local and urban government in promoting development and resilience (Giddens, 2002; Healey, 2006).

Furthermore, whilst governance is sometimes used as a synonym for government, it can better be understood as a departure from traditional forms of government (Nuissl and Heinrichs, 2011, p.48); more specifically these new governance arrangements utilise devolved or distanced decision making through a network of other actors and stakeholders, which shifts power away from conventional, centralised forms of government (Kjaer, 2009).

History of UK Urban Government

This sub-section will reflect upon the recent history of urban government in the UK, utilising a similar method of analysis to the previous chapter's review of urban design. Accordingly, Table 3.1 (below) provides an overview of the paradigms of UK Urban Government from the Second World War onwards, which have influenced the governance structures of today.

Table 3.1 – Paradigms of UK Urban Government

PARADIGM	CHARACTERISTICS
Managerial Bureaucracy 1940 - 1975	The steady expansion of local government led to large, vertically segregated bureaucracies of professionals and administrators running the city, in parallel to elected politicians. As the complexity of urban government increased, including education, public health and finance functions; so the power of elected officials decreased. Further, a paradox emerged as city government sort to create the conditions necessary for capitalism, with an agenda for humanistic reform, resulting in increased managerialism.
Neo-liberalism 1970's - today	Just as market failures had driven an ideological shift from classical liberalism to egalitarian liberalism and municipal socialism, so the apparent failures of government would lead to an undermining of the Keynesian welfare-state. Governments were seen to be bloated, over-bureaucratic and over-regulated, which in turn was stifling growth and international competitiveness. The result was 'neoliberalism', a return to classical liberalism, featuring deregulation, a rolling back of the welfare state, increased primacy of property rights and introduced an era of public-private partnerships for urban development; sometimes termed "entrepreneurialism." Notably, the paradigm saw vertical siloes emerge to tackle key policy areas.

Source: adapted from Knox and Pinch, 2009

It is important to note how these paradigms of urban government swing from one approach to a contrasting one, in a similar manner to Ellin's (1996) swinging pendulum of ideas, identified within Chapter 2. More widely, these paradigms have played an influential role in shaping urban planning and design norms.

From Managerialism to Entrepreneurialism

The term 'managerialism' is first used by Robert Park[25] in an attempt to understand the relationships between social processes and urban form, and to describe the way in which managers of scarce resources within local government become 'social gatekeepers' and 'key personnel' (Knox, 1987). It is not a theory in itself; rather it provides a framework for analysing the increasingly complex managerial bureaucracy of the era's government (Williams, 1978). In echoes of this work Antony Giddens' 'structuration theory' (1981, 1984) proposes that society involves the inter-relationships between three levels: structures, institutions and agents; this forms the basis of a 'new institutionalism', which seeks to consider how institutions, such as local government, mediate the pressures of global economic forces onto the city.

This understanding is critical when we reflect upon how urban governance has shifted from the managerial era of 1940 to 1970, to a neo-liberal, entrepreneurial paradigm; Harvey (1989a, p.3) succinctly outlines these changes:

> *"In recent years, urban governance has become increasingly preoccupied with the exploration of new ways in which to foster and encourage local development and employment growth. Such an entrepreneurial stance contrasts with the managerial practices of earlier decades which primarily focussed on the local provision of services, facilities and benefits to urban populations."*

[25] Robert Park of the influential Chicago School of Sociology used the managerialist view to explain how professional decision makers contribute to urban socio-spatial processes (Knox and Pinch, 2009).

Harvey (1989a) suggests that the origins of this change emerged from a 1985 colloquium held in Orleans, which produced a consensus that urban government had become slow and unwieldy, and needed to be more innovative to meet the demands of an increasingly globalised, de-industrialised world. This would be realised through more entrepreneurial policies, such as the active pursuit of outside investment, economic growth and civic boosterism (Harvey, 1989a).

However, in Harvey's (1989a, p.7) estimation, the *"centrepiece"* of entrepreneurialism is *"public-private partnership"*, where the private sector takes over roles traditionally performed by local government; mirroring Nuissl and Heinrich's (2011) and Kjaer's (2009) conceptions of governance through more distanced decision making networks. Somewhat cynically, Atkinson (2003, p.103) suggests that *"...one can argue that governance refers to the processes in an increasingly complex and fragmented society where the state no longer has the ability to govern successfully on its own..."*

The application of this entrepreneurialism can also be linked to policies of city competition, hollowing-out of government, speculative development and piecemeal management of cities, as well as the development of 'grands projets' such as large shopping malls and conference centres (Begg, 2002, Knox and Pinch, 2009).

Mirroring the shift between Post-urban and Urban Renaissance design paradigms is a governance policy narrative where cities have changed from being the location of urban 'problems', to the vital importance of cities for wider 'economic competitiveness' (see also Chapter 2). Similarly, the rise of theorists such as Richard Florida, who provide cities with the apparent means to be more innovative and

business friendly, have been influential during this period. Florida (2005) identifies the quality of a city's urban environment as being particularly important to its wider competitiveness; this idea would be critical to the Urban Renaissance period of UK development with an increasing focus on urban design and the quality of public spaces.

Crucially, Harvey (1989b) suggests that alongside this shift to entrepreneurism in governance, so the physical form of cities is also reconfigured to make them more receptive to global capitalist interests, and further widens societal inequalities; he refers to this as a *'spatial fix'* (Harvey, 2001). Whilst these points are well observed, it is also apparent how a corresponding governance shift is necessitated by this wider cast of stakeholders and actors, who all influence the development of urban form; something of an irony, if we consider that earlier managerial approaches were deemed too complex.

Thus, the following section will explore the development of government reforms, as a means to address this wider assemblage of stakeholders, within this changing context of urban government in the UK.

3.3 REFORMING GOVERNMENT IN THE UK

In the 1990's new approaches to government would emerge to challenge, or perhaps work within the existing entrepreneurial structures of urban governance. This new paradigm of government reforms was called many different things by different theorists and policy makers, including multi-level government, holistic government and joined-up government. From a UK perspective, whilst nuanced in their

differences, what they shared was a focus on partnership, integration and collaboration (6, 1997; 6, et al., 1999; Newman, 2001).

The origins of this new paradigm lie within a wider critique of western democracy by Anthony Giddens (2002), who observed how despite the growth of democratic nations around the world, paradoxically in more established democracies, there was greater apathy and disinterest in politics. In his (2002, p.72) estimation, this problem in democracy arose from the following malaise:

> *"In a world based upon active communication, hard power - power that comes only from the top down - loses its edge."*

Giddens' answer to this problem is a *"deepening of democracy"*; with power moved or devolved away from the hard structures of central government and a focus on the fostering of civic culture. Critically, Giddens ideas were inspirational to a generation of political academics and were enthusiastically adopted by the UK's New Labour Government, as the basis for their social policy during their years in office from 1997 to 2010 (Raco, 2013; Flint, 2006; Rydin, 2010); typically known as the Third Way.[26]

Holistic Government

Giddens' proposed move away from formal government has certain parallels with the 1980's dismantling of the welfare state under neo-liberal policy initiatives (Wilkinson and Appelbee, 1999). The confusingly named, Perri 6 (1997) suggests that these neo-liberal government reforms were an attempt to reduce the tax bill of

[26] The Third Way is a political doctrine which attempts to reconcile the divide between traditional left-wing and right-wing political positions, using a pragmatic fusion of left-wing social policies and right-wing economics (Newman, 2001).

western countries, but that was difficult when voters still wanted public services. Furthermore, he (6, 1997, p.9) argues that whilst these initiatives had arrested the growth in government costs and introduced elements of innovation, the approach had a critical flaw:

> *"... they had one overriding failure – they left government less, rather than more, able to solve the important, 'wicked' problems that most concerned electors: how to cut crime, to create jobs, to improve educational performance and health*."

In essence 6, highlights the fragmented and siloed nature of government departments and policy, further widened by the inclusion of non-state actors and institutions, which struggle to deal with the 'joined-up problems' of crime, jobs and education. These sorts of issues, which cut across different departments, policies and responsibilities, mirror the complex nature of urban design, built environment and resilience issues. Accordingly, 6 (1997) proposes that the answer to this problem is "*holistic government".*

From a wider review of holistic government, a number of key criteria have been identified. 6 et al. (1999) suggested that policies of holistic government began with the acknowledgment that the costs of retrospective policies to tackle social problems, massively outweighed the costs of preventative action, thus necessitating the need for prevention through '*anticipatory governance'*. Further, the failings of siloed and fragmented government departments and their initiatives could only be resolved by *'integration of policy areas'* (6, et al., 1999). This integration would thus require greater *'community involvement', 'partnership working'* between internal

and external stakeholders, and *'policy based on ongoing research'* (Wilkinson and Appelbee, 1999). In the estimation of Newman (2001), the final pieces of the jigsaw necessary for holistic governance were a commitment to *'culture changing'* amongst stakeholders and the incorporation of *'multi-level governance'*; operating through an integrated network of tiers, including national, regional, local and sub-local/community levels.

Whilst 6 et al. (1999) suggested that there were historic precedents for holistic governance, in particular the Single Regeneration Budget introduced by the earlier Conservative administration which put forward a single pot to fund physical, social and economic initiatives, it was not until the mid to late 1990's era of governance reforms under New Labour, when significant attempts at holistic government policy were put into practice.

New Labour's Governance Reforms

Riding on the wave of these academic and policy debates, the New Labour Government, who swept to power in the UK in 1997, put government reforms at the heart of their policy agenda, utilising aspects of joined-up and holistic government (Newman, 2001).

In an attempt to 'modernise' the state, New Labour introduced multi-level governance, with devolution to national and regional tiers of government (Newman, 2001) and policies to engender greater activity at a local level; the so-called "new localism" (Stoker, 2004; Coaffee and Healey, 2003). These policies were part of a wider initiative to redefine and reclaim a role for the state in public life (Stoker,

2004), which also saw more blurring of the boundaries of responsibility for tackling social and economic problems, and an embrace of wider policy networks into government practice (Newman, 2001). [27]

Urban regeneration was a key policy objective, enabled by partnership and promoted through networked community governance, which Stoker (2004, p.59) outlined in this context:

> *"Governance involves processes of negotiation and bargaining which give recognition to the legitimacy of many stakeholders and participants."*

Flint (2006) argued that the use of community as both the location and process of governance was the defining element of New Labour's Third Way. Further, rebuilding community can be seen as a means towards increased self-governance, community capacity and communitarianism, which can be viewed as an alternative to neo-liberalism (Newman, 2001), but also as a further reduction of the state.

Other governance practices of the era included: "Best Value"[28], democratic renewal (Stoker, 2004), greater monitoring of outcomes and performance, with punitive measures for failures by institutions and individuals. For institutions this could involve outside organisations taking over 'failing' organisations, for individuals it could mean a 'responsibility' to work and the resulting loss of benefits should they be seen to fail in this duty (Newman, 2001). Crawford (2003)(cited by Flint, 2006) and Newman (2001) term these new governance methods and their accompanying

[27] A good example of such a policy was Coaffee and Healey's (2003) study of 'area committees' in Newcastle, which outlined the difficulties of local area groups in affecting local planning and decision making.

[28] An alternative to compulsory competitive tendering, attempting to look at wider cost issues (Newman, 2001).

social policy approaches, *"contractual governance"*. Contractual governance attempts to foster conformity, responsibility and social order, and parallels Foucault's ideas of government at a distance (Flint, 2006; Raco, 2013).

A number of holistic government policies were put into place during this era. In particular, the Social Exclusion Unit and the New Deal for Communities, which Stoker (2004) suggests involved both top down and bottom up methods. However, both Stoker (2004) and Newman (2001) note how policies of governance reform were increasingly lost during New Labour's time in government; overtaken by other political agendas, whilst the rejection of a North-east Assembly was also a significant blow to governance reform. However, this period does offer an opportunity to study the issues associated with putting measures of governance reform into practice.

Holistic, Multi-level Governance and Partnership in Practice

Looking at implemented policies for holistic and multi-level governance under New Labour, a number of observations can be made. In the current context, one challenge for multi-level or holistic governance is the abolition of the regional tier of UK government, which Coaffee (2009) identified as being critical to the successful roll-out of resilience policies; see Chapter 4 for further details. Whilst there have been failures in the policy of multi-level and holistic governance (Stewart and Grimshaw, 2002), 6, et al. (2002) suggested that policy integration was possible through all areas of government.

In echoes of the Managerial Bureaucracy paradigm, Newman (2001) suggests that new governance approaches challenge existing notions of democracy by reducing

the power of locally elected officials; it is certainly a more 'technocratic' approach (6, et al., 2002). Similarly, there was a suggestion that wider institutions and individuals working within these governance arrangements lacked legitimacy and that there are inter-organisational tensions (Stewart and Grimshaw, 2002). However, perhaps the critical difficulty is one of change; as Stoker (2004, p.3) notes, *"institutional change is a complex theoretical challenge."*

There is a large body of academic work devoted to considering organisational change; within the context of this study, it is worth briefly reflecting on some of the key points of this discourse. The ability of a 'locale' to change their institutional structure to meet new, dynamic changes has been referred to as *"institutional thickness"* (Amin and Thrift, 1994) or *"Institutional capacity"* (Healey, 1997). The key characteristics of institutional thickness are the relational networks, which allow communication and collaboration, as a means to achieve consensus, with well-defined power and control structures. Critical to this, as well as the wider success of holistic and multi-level governance is partnership.

Newman (2001) suggests that partnership is both complex and potentially difficult. Interestingly, 6 et al. (2002) highlight the importance of failure as a tool for learning and understanding what works for partnerships and holistic government initiatives. In effect, they suggest that it requires a pragmatic approach, rather than following any particular set of theories or rules.

A key aim of partnership is to engender greater community support and input; but that is often hampered by a widespread lack of trust in public institutions (Stoker, 2004), as well as further cynicism, apathy and 'consultation fatigue' (Coaffee and

Healey, 2003) directed towards many initiatives by members of the public. Moreover, when reflecting on a study of 'area committees' in Newcastle, an initiative to establish greater interaction between the community and decision makers, Coaffee and Healey (2003, p.1997) concluded with the following observation:

> *"...this account of the early experience of the Newcastle area committee initiative provides a substantive illustration of the contradictions in the national 'modernising local government' project, with its tensions between centralising power to get strategic focus and its encouragement for greater citizen voice."*

This observation mirrors a wider problem with partnership; that it necessitates a more long-term approach to be successful, but in practice government priorities often change more quickly and thus more short-term goals emerge to derail or undermine the partnership's work (Newman, 2001). As Mottram notes, top-down initiatives got quicker results (2000; cited by Newman, 2001), and these were often used as politicians became impatient for action. It could be concluded that New Labour's adoption of holistic government and partnership working were somewhat half-hearted and lacked sufficient time to be effective. Further, Newman (2001) suggests that partnerships were hampered by proscriptive and bureaucratic funding regimes, whilst there was a paradox between greater inclusion and involvement, with the coercive welfare regime of the time (Newman, 2001).

More positively, Newman (2001, p.113) puts forward four principal imperatives of partnership:

- Accountability - having proper structures, formalised roles and transparent procedures.
- Pragmatism - getting things done, meeting targets.
- Flexibility - adapting fast to changing conditions, expansion.
- Sustainability - fostering partnership, building consensus and embedding networks to ensure long-term development.

These imperatives offer important insights into successful partnership and governance arrangements. It is also important that partnership is given sufficient time to work. However the key finding would be the importance of vertical and horizontal integration of governance structures, as articulated by Wilkinson and Appelbee (1999, p.7):

> *"Critically, the vertical networks of power, resources and professional activity, have to be translated into horizontal networks of durability, trust and loyalty."*

Collaborative Planning

From a built-environment perspective, partnership is often assumed to involve some form of community participation, consultation or engagement. This tradition emerges from the pluralist planning turn, explored in Chapter 2.3. As Healey (2006, p.70-71) notes in *Collaborative Planning*:

> *"Unless all stakeholders are acknowledged in the process, policies and practices will be challenged, undermined and ignored. Unless participants learn how to build consensus across their differences, agreements about*

policy directions will not endure, disintegrating at every challenge. If stakeholders come from different cultural communities, however, building consensus in inclusionary ways will be socially and politically demanding, requiring careful attention to the communicative practices through which trust and understanding can develop."

In the quote above, Healey acknowledges the almost universally held belief that some form of engagement is necessary to successful urban development; what is much less clear is how this is best achieved. This study does not seek to provide a review of what is a wide and thorny topic, but it is important to briefly reflect where it provides context to the wider study. A typical example of the inherent difficulties of good community engagement is offered by Beazley et al. (1997), who described how community wishes in Birmingham were overlooked in favour of economic interests. Similarly, Till (2005, p.1) notes how public participation is often a form of placation, which actually distances communities from *"the real processes of spatial production."* Acknowledging the inequality of power in these situations, he also warns against putting too much power in the hands of those without *"expert knowledge".*

What is needed is some way or process to mediate between these often competing needs and understandings. It is in this context that *Collaborative Planning* becomes relevant, with Tewdwr-Jones (2013) suggesting that it is now the dominant paradigm for public and community engagement.

"The activity of planning, as a conscious policy-driven effort to insert a strategic, long-term, interrelating viewpoint into governance processes, has

> *the capacity to assist the task of relational capacity-building by its role in informing political communities about the range of stakeholders and about how they like to discuss issues; by its role in helping to shape arenas where stakeholders can meet ; and by helping those involved work out what it means to build new collective ways of thinking and acting, to re-frame and re-structure their ways of proceeding. Those involved as experts in this process should have an ethical duty to attend to all stakeholders as the interactive process develops. The result is a process of collaborative planning."*
>
> (Healey, 2006, p.312)

Whilst Healey's definition initially appears complex, it can be more simply understood as an approach that uses understandings gleaned from multi-level and holistic government, underpinned by Giddens' theories of 'New Institutionalism', to inform a new approach to engagement in urban planning and development based upon communicative means. It is grounded in the understanding that conflict and instability are normal qualities of local government decision making in a socially diverse society, which Healey contends that formal planning procedures have attempted to stifle or to distance citizens from engaging in their basic democratic right.

Built upon the work of Habermas, Foucault and Giddens with power and relations, collaborative planning proposes that in a complex world it is necessary to have a social arena where different voices and forms of 'local knowledge' can come together for 'consensus building' and 'sense making', within a wider process of place making. Notably, Innes and Booher (2014) have suggested that the tools of

consensus building are even more relevant to the emerging field of 'complexity science'; this area is discussed further in Chapter 4.

That Healey uses the term 'placemaking' is significant to this project. It is an acknowledgement that 'process matters' as Healey (2003) contends, but also the need for built environment to be inclusive of the social, economic and environmental aspects, mirroring the understanding of urban design as a "socio-spatial process" concluded within Chapter 2.

Accordingly, further reflections on collaborative planning can also be illuminating for urban design practice. Collaborative planning advocates "sense making" through which participants attempt to reframe and understand problems or constraints collectively. It is an iterative process, which learns from previous experience, but is not necessarily outcome focussed. Finally, Healey argues that collaborative planning changes the structure of local governance to be more inclusive and self-adapting (Healey, 2003, 2006).

As a brief summary, Hall and Rowlands (2005) suggest that collaborative planning is underpinned by five principles:

- Integration in policy making,
- Collaboration in policy making,
- Stakeholder involvement,
- Local knowledge,
- Building relational resources.

Collaborative planning has attracted some criticisms, perhaps best summarised by Allmendinger and Tewdwr-Jones (2002), who suggest that it is not a new planning paradigm, rather a mixture of post-modern and neo-liberal approaches, that collaboration is not the only means of accommodating diversity, that the approach is superficial, and assumes that all participants in the process are equal, avoiding hidden power relations and undermining the value of professional expertise. These comments seem overly critical, particularly given the potential of the approach to improve urban planning and development processes, but also wider issues of democracy and engagement. Perhaps they associate the approach with the wider deregulation of planning, as it could also be argued that collaborative planning also attempts to take planning out of the hands of planners. However, examples of collaborative planning in practice are still relatively limited.

For this study Collaborative Planning provides the ideal conceptual framework for attempting to reconcile the emerging qualities of urban resilience with urban design initiatives, but it is also important to reflect upon issues of urban planning governance in some further detail.

The New Spatial Planning

Despite its name, it could be argued that collaborative planning is actually a much wider governance strategy, rather than an approach to urban planning *per se*. In contrast, concepts of 'spatial planning' are at the heart of contemporary planning practice and are increasingly informed by developments in the practice of governance (Tewdwr-Jones, 2013).

> *"Spatial Planning goes beyond traditional land use planning to bring together and integrate policies for the development and use of land with other policies and programmes which influence the nature of places and how they function."*

(ODPM, 2005, p.12-13)

Perhaps the most significant publication on the subject of spatial planning is *"The New Spatial Planning"* by Haughton et al. (2010), which saw 'Spatial Planning' as the process of continuous remaking of planning, as a means to make planning more responsive and adaptable and as meta-governance; the governance of governance. It could also be said to be an exploration of planning in the places where planning is rarely considered, further promoting the importance of iterative remaking and imagining better systems.

There are broadly three key elements to The New Spatial Planning:

- Rescaling of functions - multi-level and less overtly hierarchical;
- Its spatial nature;
- Focus upon coordination, integration and inclusion.

In their wider work on the topic, Allmendinger and Haughton (2009, p.631) talk about the "restless search" for best governance scales; arguing that there is a need to utilise more 'fluid' scales and 'fuzzy boundaries' which don't align with existing planning or political jurisdictions and allow practitioners to break away from, territorial tensions, pre-existing working patterns and siloes. Similarly the formal processes of planning, which they term 'hard spaces', are increasingly less

important; rather it is the 'soft spaces' where implementation occurs through bargaining, flexibility and interpretation, that are increasingly valuable to planning (Haughton, et al., 2010). The focus is on imagining place-making activities which can better reflect the real geographies of problems and in ways that policy-makers can address, such as issues of urban vulnerability.

Allmendinger and Haughton (2007, p.1493) acknowledge the wider network of stakeholders in contemporary governance that soft spaces rely upon:

> *"We argue that integration, consultation and coordination are the key concerns in the new systems of subnational governance."*

However, the relationships between UK stakeholders has been in a state of flux as a result of government initiatives that have attempted to embed resilience into the everyday practices of planning and urban governance (Coaffee, 2013a), whilst also accommodating significant budgetary cuts and re-scaling of functions (Peck, 2014). Thus the following section will look in further detail at the policies and practices of the UK planning system, which have shifted significantly in recent years as a result of reforms and policy changes enacted by the Coalition Government; these policies define the 'rules of use' into which urban resilience initiatives must embed.

3.4 URBAN PLANNING & GOVERNANCE

The purpose of this section is to provide an overview of UK urban governance structures and processes, with particular attention to development, design and resilience. In this context, the planning system is the primary means of decision making, although as Tewdwr-Jones (2013, p.192) notes, the planning system is now

part of a wider governance frame with different layers of institutions, with a diverse range of roles and responsibilities.

> *"These driving forces of state restructuring, multi-level governance and central government policy have led to a heady mix of policy initiative across government to which planning, and spatial planning especially, has been directly and indirectly subjected."*

The Planning System

The current UK Planning system retains many aspects, features and functions from the original 1947 Town and Country Planning Act. In essence, policy is set at a national level with decisions made by local authorities and validated by elected councillors (Tewdwr-Jones, 2013). However, planning has seen many substantial changes from these *"public health origins"*, with new institutions and scales of function in operation, as this section will seek to explore (Cullingworth and Nadin, 2006).

In broad terms local authorities, represented by councillors and officers, liaise with a variety of governmental and non-governmental agencies, and work within a policy hierarchy set by central government (Cullingworth and Nadin, 2006). Planning at both a national and local level is often dictated by the whim of incumbent politicians (Healey, 2012).

Referring to the planning system, Healey (2003) describes it as *"...a mechanism for mediating among conflicting interests at various scales."*

At an urban level, planning is overseen by Local Planning Authorities (LPA) within England and Wales. The scope and powers of these authorities, which is a combination of two-tier and integrated, "unitary" authorities, is determined by the type of council they are located within; these being: non-metropolitan county, non-metropolitan district/borough and unitary authorities (Cullingworth and Nadin, 2006)[29]. Whereas unitary authorities have responsibility for all local authority functions, outside these (largely urban) areas, county councils act as parent authorities to multiple district councils, with responsibility for strategic planning and a range of major services, such as transport and highways, education, waste management and fire services, whereas district councils decide planning permissions within a framework governed by strategic plans.[30]

LPAs typically have three areas of function: development control, enforcement and policy (Cullingworth and Nadin, 2006).

> *"Spatial planning systems have typically evolved in an urban context to set limits on what private owners can do with their sites and buildings."*
>
> (Healey, 2006, p.73)

Following submission by private agents to the relevant authority, reports are prepared by Council Officers (dependent on the context of application this will typically include planners, transport planners, heritage experts, urban designers, etc) which will inform the decision of the local planning committee. Submissions from

[29] Rural authorities have an additional level of sub-local government, with parish councils.
[30] The exception to this is London where 32 London Boroughs share strategic powers with an elected mayor and the London Assembly, as well as the City of London Corporation, which in effect acts as another Borough (source).

statutory and non-statutory consultees (such as the Environment Agency on flooding, or English Heritage on historic buildings), as well as local individuals and interest groups, will also be available to the planning committee. This committee is made up of non-technical, elected local councillors, with professional input typically coming from the head of planning, and their decisions are in theory made on the basis of local and national policy. In certain instances, decisions can be made by 'delegated officers', where they are straight-forward or uncontroversial (Tewdwr-Jones, 2013; Cullingworth and Nadin, 2006).

Describing the contemporary role of planning in the UK, Tewdwr-Jones (1999, p.139) drew a fatalistic conclusion:

> *"Planning has been reduced to a bureaucratic regulatory process in which the political has been downplayed in the interests of organisational efficiency. The "vision thing", the concept that gave birth to town planning as a professional activity in the early years of the twentieth century, has been lost, partly as a consequence of legislative fiat, a New Right determination to standardise and commodify planning as a public service, and individual planners' recalcitrance. Town planning is no longer a political and professional activity; it is rampant technocracy, shared between the public and private sectors."*

Perhaps, the most commonly held criticism of the planning system is that it makes poor decisions (Punter, 2007; Bosher, 2014), with Tewdwr-Jones (2013, p.45) accusing local authorities of *"favouring the lowest-common-denominator solutions".* Furthermore, the speed with which planning decisions are made is often a source of

criticism amongst politicians (Daily Telegraph, 2012), whilst planning reforms have also attempted to speed up this process (DCLG, 2012a).

Perhaps as a result of this continued criticism, the work of planners has often taken on a legalistic quality, with forensic examination of policies and past developments. Of course, planning is ultimately enforced by both legal and quasi-legal institutions, through judicial review or a public inquiry (Cullingworth and Nadin, 2006).

Perhaps this goes some way to explaining the poor morale of planners, as hinted by Tewdwr-Jones, and further elaborated by Eraydin and Tasan-Kok (2013, p.229):

> *"The mission of the planner has never been as frustrating as it is today. While planning practice is littered with such terms as democratisation, participation and collaborative decision making, most planners have strong doubts as to whether they are fulfilling their primary mission, that is, to prepare cities for the future. Their role today has rather become one of solving daily problems to satisfy the interests of the dominant actors in the urban system."*

Of particular relevance to this study, is the role planning plays in promoting and ensuring the quality of design in the built environment; especially urban design. As chapter 2 highlighted, promoting urban design to mitigate the dearth of good quality design in UK development was a key aim of the Urban Renaissance (UTF, 1999; UTF, 2005).

An interesting perspective on this very issue was provided by John Punter (2010), writing a "Centenary Paper" on the role between planning and design, in response to a claim from Central Government that *"good design was indivisible from good*

planning" (ODPM, 2005)(cited by Punter, 2010). The paper was also written on the cusp of the change from New Labour to Coalition administrations, and thus offers an interesting perspective, particularly focussed on urban design. Punter (2010) makes a number of important points on the issue:

- Generally, there is poor delivery of design at a local level;
- There is a weakness on community engagement relating to design;
- Redundancies have reduced design staff in both the public and private sector;
- Lack of design skills amongst LPA officers;
- Potential benefits of regional design review panels;
- Design initiatives are often constrained by corporate priorities;
- Lack of design leadership at executive and corporate levels;
- Failures to join-up departmental perspectives to ensure design objectives.

Punter (2010, p.374) concludes:

> *"So the conclusion must be that the policy framework for the indivisibility of good design and good planning is firmly in place at the national level, but its delivery faces major challenges at the local government level."*

It is somewhat worrying that so many of the recommendations are aimed at regional level, which has since been abolished; see section 4.2. Further, it identifies the local level as most problematic to the implementation of successful urban design, and which now has the primacy of powers on how to implement this issue.

There are certainly parallels between the difficulties encountered by local authorities in promoting design, and other forward planning issues, which equally need cross-

professional/departmental consideration and some element of preparedness or forward planning, as opposed to commenting reactively to schemes brought forward by the private sector. Tewdwr-Jones (2013) particularly highlights the issues of individual well-being, the provision of multi-functional green infrastructure, flood risk, water demand and food security, as potentially significant for urban planning in the future.

Like design, many of these issues necessitate the involvement of other local government functions and agencies, which are horizontally separated from planning or located in other departments/silos, e.g. transport, housing, social services, sustainability, waste management, and importantly from the perspective of this study emergency services and resilience teams. This need for joined-up thinking was the rationale for governance reforms discussed in section 3.

The following section will explore recent UK planning reforms that are particularly relevant to this study.

Recent UK Planning Reforms

> *"The planning system is vital for a strong economy, for an attractive and sustainable environment, and for a successful democracy. At present, the planning system in England achieves none of these goals. It is broken."*
>
> (The Conservative Party, 2010)

This opening quote, taken from the Conservative Party Policy Green Paper on *"Open Source Planning"*[31] and published prior to the 2010 General Election, could be said to encapsulate much of the thinking that has shaped the Coalition Government planning policy, since their election in 2010. Recent years have also been notable for the many statements from Coalition politicians disparaging planning, planners and local planning authorities; exemplified by this joint statement from David Cameron, Prime Minister and Nick Clegg, Deputy Prime Minister:

> *"We're determined to cut through the bureaucracy that holds us back. That starts with getting the planners off our backs."*
>
> (Daily Telegraph, 2012)

These quotes demonstrate the political mandate for radical reform of the planning systems, and the opposition to formal planning as a way of cutting 'red-tape' for business growth. Accordingly, the Coalition Government from 2010 to 2015 proposed a series of acts which made significant changes to the policy context for planning, design and resilience, and would frame the practice of these issues within the embedded case study.

The Coalition Government's first major piece of urban planning policy was a move towards *"localism"*, with a 're-scaling' of planning governance through the abolition of the regional tier of planning[32], as a way to supposedly empower local level

[31] The term, "Open Source", derives from IT concepts of "Open Innovation" (Chesbrough et al., 2006), whereby software and ideas are developed by individual users for communal benefit.
[32] The exception to this was the London region, which remains in place today (Bentley et al., 2010).

decision making.[33] The act also introduced a new, sub-local 'neighbourhood' level of planning, as well as 'Local Enterprise Partnerships' (LEP's)[34], potentially allowing both communities and businesses to make their own development plans.

Reflecting on these changes, Tewdwr-Jones (2013) notes how in an increasingly complex national governance landscape, it is critical for local context and input, but also express concern at the loss of the evidence base for regional plans. The wider scepticism amongst planners for this new 'localism', is encapsulated by Bentley et al. (2010, p.1), who suggests that these moves are in fact, *"re-centralisation in disguise."*

However, the critical development policy of the Coalition Government was the introduction of the National Planning Policy Framework (NPPF), which aimed to make planning simpler and faster, whilst also prioritising economic growth and new development. To do so, the NPPF abridged national policy from just over 1,000 pages, originally contained within 25 Planning Policy Statements (PPS), into just 58.

Amongst the Acts much-heralded changes, the NPPF introduced a "*Presumption in favour of sustainable development"* which was defined almost solely in economic terms[35], as well as an imperative towards *"Building a strong competitive economy"* which would see economic growth prioritised as a consideration within planning (DCLG, 2012a). This economic primacy would be further strengthened by the later Growth and Infrastructure Act 2013, which appeared to focus on development

[33] Under the old system, Regional Spatial Strategies had informed local level planning, e.g. set targets for housing.
[34] LEP's are business-led public-private partnerships, created to fill the economic development role, formerly held by Regional Development Agencies, working at a "city-region" level.
[35] Tewdwr-Jones (2013) suggests that there was already an implicit assumption in favour of development.

growth at almost all costs and mark a return to planning decisions increasingly controlled by Central Government[36]. Critically, the act contained measures for the renegotiation of planning applications where the applicant believed them to be 'economically unviable'; potentially removing provision for affordable housing, contributions to public realm works, and even reducing the quality of urban design.

Whilst the NPPF made a number of passing mentions to the importance of 'high-quality design', there is a lack of specificity about how this is achieved or what it would look like. Moreover, there is no reference to urban design within the NPPF and the stipulation that "*design policies should avoid unnecessary prescription or detail"* (DCLG, 2012a, p.15), appears to discourage planning authorities from making design an important consideration in plan making or when deciding planning applications. So whilst the NPPF advocates design review as a way to improve design[37], there is a wider sense that urban design has been all but abandoned within national policy.

This is substantiated by the withdrawal of almost all design guidance under the Growth and Infrastructure Act, as well as the removal of the requirement to produce 'design and access statements' (D&A) in most planning applications; in effect the D&A is a supporting document, which includes drawings and illustrations to outline the design rationale for a given development, and is an important tool for communicating design intent and quality. The introduction in 2014, of *Planning Practice Guidance* in the form of a number of web-based statements, would attempt

[36] The act contains measures to strip poor performing authorities of powers, as well as allowing developers to bypass local authorities and have their applications determined by the central Planning Inspectorate.

[37] This comes at a time when funding for design review has been cut, with local and regional architecture centres no longer receiving funding through CABE (Building Design, 2012).

to provide further guidance on design. However, these text based platitudes do not provide the technical or spatial information necessary to promote better design or associated decision-making.

More positively, the NPPF refers to the importance of resilience on a number of occasions, including references to flood resilience and accommodation for climate change. Critically, it also includes new obligations for resilience to be implemented by local authorities, including a requirement to (DCLG, 2012a, p.40):

> *"work with local advisors and others to ensure that they have and take into account the most up-to-date information about higher risk sites in their area for malicious threats and natural hazards, including steps that can be taken to reduce vulnerability and increase resilience."*

On the topic of flooding, a separate technical annexe outlines how a "sequential test" to determine the appropriateness of a development in relation to flood risk. Figure 3.1, below, illustrates the flood risk compatibility against the "vulnerability" of developments and is also referred to in section 8.2. Whilst the document doesn't illustrate what constitutes a vulnerable development, this was later clarified by the online *Planning Practice Guidance.*

Figure 3.1 – The Sequential Test for Flooding

Flood risk vulnerability classification (see table 2)		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood zone (see table 1)	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test required	✓	✓
	Zone 3a	Exception Test required	✓	×	Exception Test required	✓
	Zone 3b functional floodplain	Exception Test required	✓	×	×	×

Key: ✓ Development is appropriate.
× Development should not be permitted.

(Source: DCLG, 2012b)

More widely the Coalition policies have attempted to reconcile deregulation of planning and increased economic outcomes, with greater stakeholder input, achieved through a downward rescaling of responsibility. It will remain to be seen if the twin paradigms of economic and community development can be maintained, but the re-centralisation of certain powers and further planning deregulation, suggests a policy direction towards economic primacy. These policy reforms suggest that design is no longer the political priority that it once was, whilst it is unclear how the critical difficulty of promoting design at a local level, identified by Punter (2010), can be overcome.

Furthermore, whilst the Government appear keen to devolve responsibility, this does not necessarily translate into power. So while Coalition politicians have frequently

talked about utilising ‘collaborative planning’ (Tewdwr-Jones, 2013), it is unclear whether they appreciate the full meaning of the term, or if they simply interpret it as planning with public consultation. More meaningfully, it has been suggested by Raco (2013), that far from empowering local decision making, these reforms represent a further ‘hollowing out’ of state power, by dismantling a planning system that is the embodiment of the post-war welfare state.

What becomes increasingly clear is the complexity of existing UK planning hierarchy. Thus, distinct differences have emerged between the planning systems operating in England, Wales, Scotland and Northern Ireland, whilst there appears to be no diagram or model available of how the current planning system operates, either in Government publications or textbooks.

Accordingly, Table 3.2, below, shows a simplified representation of the planning hierarchy under New Labour and Coalition Governments.

Table 3.2 – UK Government Re-Scaling

Scale	New Labour Planning Hierarchy (2004-2010)	Coalition Planning Hierarchy (2010 - 2015)
National	National Planning Policy 25 Planning Policy Statements (PPS)	Reduced National Policy (NPPF) Separate Minerals Act and Planning Circulars.
Regional	**Regional Spatial Strategy** (Key Scale) Regional Development Agencies	
Sub-national		Duty to cooperate Local Enterprise Partnerships (LEPs) "City- Region" focus
Local	Local Development Planning	**Local Development Planning** (Key Scale) Increased flexibility at local level, e.g. no longer constrained by regional targets.
Neighbourhood	Limited sub-local planning e.g. Business Improvement Districts (BIDs)	Neighbourhood Planning Community/Business Partnership

(Source: Authors own, adapted from national policy documents)

It should be noted that that whilst the scale is referred to as sub-national by the Coalition Government, it is more accurately sub-regional[38]. However, the most

[38] More confusingly, a number of Government departments use the term 'area' to refer to sub-national scale working areas.

significant issue to be taken away from this figure is the re-scaling towards a local level that recent planning reforms represent.

Austerity and Barriers to Growth

Since the "credit crunch" of 2008, "austerity" and the resulting cuts to public services has been a major theme in public discourse and policy, and one that has had an impact upon urban planning and development (Carpenter, 2012).

A 2012 joint survey carried out by *"Planning"* magazine, in partnership with the RTPI and the Planning Officers' Society looked at how Coalition Government policies and accompanying budget cuts have impacted upon Local Planning Authorities (LPAs), as assessed by head planning officers. The significant findings of this survey are (Carpenter, 2012):

- Professional Planners employed by LPA's have fallen by 12.62% (on average 2.8 staff members).
- When asked if they would need to make further cuts in staffing in the next year in order to meet budgetary requirements: 37.3% said Yes, 21.3% No and 41.3% Not clear yet/Don't know.
- When asked if they had the necessary resources to support the production of neighbourhood plans: 13.5% said Yes, 78.4% No and 13.5% Not clear/Don't know.

This survey paints the picture of a struggling and demoralised workforce, whilst there is a clear indication that LPA's cannot support the localist planning initiatives that have been a major aspect of Coalition policy. It is telling that when David

Cameron launched a "Red Tape Challenge" to cut bureaucracy, planners were singled out for criticism (Cabinet Office, 2014).

More recently, Peck (2014, p.400) has suggested that the policies of entrepreneurial governance first described by Harvey, have been perpetuated and accelerated by budget cuts and austerity, and that:

> *"On this more fiscally and organizationally denuded terrain, there may now be less actual risk-taking at the level of city policy and locally designed projects, but in a much more profound sense, systemic risk has been absorbed into the deeply financialized and corporatized structures of urban meta-governance."*

From the review of literature and ongoing policy, contained within this chapter, a picture emerges of the key policy and governance issues for this study. In contrast to earlier eras, there is less focus on design quality or its value, economic growth is increasingly seen as the only valid outcome of planning, which also needs to deliver these outcomes more quickly, whilst costs in all public sector activities are expected to fall. With increased risk aversion in the market and an apparent further retrenchment of state, there is a potential for decreased resilience within the urban planning and design sectors. Together, these economic and policy factors are impacting upon UK cities; critical to this study will be to reflect upon their impact in practice.

3.5 SUMMARY

Coaffee's (2013) quote in the introduction to this chapter about the importance of governance to the practice of resilience is a foretelling for much of the findings within this chapter. The exploration of the origins and application of governance identified how urban decision making and practice increasingly involves wider informal networks and a move away from traditional, 'managerial' government. Accordingly, these new networks require new approaches to integrate and coordinate the collective management of affairs in a more joined up and holistic manner.

Within this context, Healey's 'collaborative planning' promotes policy and stakeholder integration, as well as a way to develop strategies for diversity and complexity. However, a critique of governance strategies under New Labour's government reforms suggests that there were limited successes, whilst inherent tensions over greater local responsibility emerged; as Parkinson (2004, 2009) noted, efforts to include wider stakeholders in local government processes can often reinforce the limitations of their influence and increase disaffection. Further, these policies also demonstrate the difficulties in affecting change, and the inherent problems around new policies which necessitate restructuring within local government.

In partial answer to this issue, Healey's (2012) more recent work has addressed how governance micro-practices can positively transform policy processes and political cultures, as a means to reverse the dominance of financial and corporate concerns in urban discourse. Of particular relevance to this study Healey (2012, p.27) examines

the work of local groups, or *machizukuri,* in Kobe, Japan, describing the positive effect of these groups following a major earthquake:

> *"The networks they had built up in their local areas, and their connections within and beyond the municipality, provided a mobilization and organization capacity that helped reduce the spread of fire, rescued the elderly and infirm, and provided shelter."*

Healey (2012, p.26) suggests that the Kobe study exemplifies "*adaptive resilience"*, as well as illustrating how 'civic society' can contribute to *"resilient governance capacity"*. This echoes writing from resilience and disaster risk reduction literatures, which highlights the critical importance of collaboration (Coaffee and Bosher, 2008, Bosher, 2008; Bosher et al, 2009), and which will be explored further in Chapter 4.

The review of urban planning and governance also identified the challenges for planning authorities around promoting good quality urban design at a local level, as well as making timely, well-informed decisions. Moreover, the pervasive dominance of economic interests within urban governance appears to be perpetuated and reinforced by policies of austerity.

Accordingly, these issues highlight the need for greater understanding of local practice, as a means to understand the success of governance policies which promote design and resilience, in relation to the exemplar practice of collaborative planning.

Key Findings

The purpose of this final section is to draw out some critical reflections from this governance review.

Both horizontal and vertical integration of governance practices were found to be critical to address the cross-disciplinary urban problems which this study considers. As Wilkinson and Appelbee (1999) noted, vertical networks of governance scale bring 'power, resources and professional activity', whilst horizontal networks of different organisations and policy areas are built upon 'durability, trust and loyalty'. Similarly, in the current governance era, local and national government can no longer act alone, thus successful partnerships are needed to address the 'wicked problems' of the era. In the estimation of Newman (2001), partnership requires: 'accountability', 'pragmatism', 'flexibility' and 'sustainability'.

At the heart of Collaborative Planning is the idea that policies cannot be successful unless all necessary stakeholders are engaged (Healey, 2006). From this perspective, governance structures should promote initiatives for greater stakeholder input and encourage wider engagement; in effect providing integration. Thus in contrast to the often siloed function of many local authorities, there is a need to create formal structures to allow the integration of different stakeholders and professional expertise into local decision making processes. Critically, this should include strategic planning for resilience and measures of foresight, which anticipate future events and uncertainty. In contrast to these formal governance structures and spaces of planning, there is also a need to promote the use, 'soft spaces', which utilise informal networks and negotiation, as well as 'fuzzy boundaries', that encourage

new ways of working across professional and political boundaries (Haughton et al., 2010).

Moreover, given the complex nature of the urban medium, a key point gleaned from the study of the UK's governance reforms is the need to learn from earlier initiatives (Healey, 2006; 6 et al., 2002). There is thus a need to build into governance processes, mechanisms for continuous reflection, learning and change. As the studies of implementing holistic governance highlighted the difficulties of successfully initiating change within local governance structures, there is therefore a need to build 'Institutional capacity' (Healey, 1997) to accommodate changing policy priorities over time.

Finally, this chapter has highlighted the importance of promoting collaboration and integration through governance arrangements, as well as the need for change and 'adaptive governance' (Healey, 2012). These issues will be integral to the subsequent review of urban resilience, as a means to connect policy and practice, design and governance.

4 TOWARDS URBAN RESILIENCE: INTEGRATING GOVERNANCE AND DESIGN

4.1 INTRODUCTION

The purpose of this concluding literature review chapter is to explore the emerging fields of resilience and urban resilience, and in doing so address how these new understandings can integrate considerations of urban design and governance. The introduction to this thesis highlighted the vulnerability of urban areas to a multitude of risks and thus the critical importance of resilient design to the future of cities. However, as this quote from Coaffee et al., (2012, p.3) highlights, this requires more than just an appreciation of material considerations:

> *"Resilient design is therefore a holistic activity involving a range of activities which shape and manage the built fabric so as to reduce its vulnerability to a range of hazards and threats. It is concerned with both the spatial form and redesign of the built environment as well as the processes that help shape it."*

This definition, which recognises the importance of the processes which drive the design of urban spaces, echoes the increasingly transdisciplinary understanding of resilience, where the concept is used as an integrator and lens for addressing a wide range of issues (Coaffee, 2013a, 2013b); comprehensively articulated by Vale (2013, p.1):

> *"Resilience is, simultaneously, a theory about how systems can behave across scales, a practice or proactive approach to planning systems that applies*

across social spaces, and an analytical tool that enables researchers to examine how and why some systems are able to respond to disruption."

However, in spite of this theoretical development, and the ever increasing prevalence and diversity of the term's use, practical application of the concept is limited and often poorly understood. Consensus within this theoretical framework is required, as well as performative principles for the practical application of the concept, if we are to promote a more wide ranging and resilient urbanism. Accordingly, this chapter begins with a review of the numerous conceptions of resilience that have emerged, an appraisal of the origins of the term, including Holling's adaptive cycle of systems ecology, and the associated developments of 'complexity' which have informed its development. It will then reflect upon the more grounded approach of 'resilience thinking' (Walker and Salt, 2006, 2012) and the contemporary relevance of resilience to the urban environment.

The chapter's third section will begin by establishing the importance of risk to the 'resilience turn' in urban policy, before considering in greater detail how this has been translated into UK resilience policy through a series of 'waves' (Coaffee, 2013a, 2013b). This policy analysis will reflect on the temporality of policies with a particular focus on water and flood resilience, which also highlights the tensions surrounding 'rescaling' and 'responsibilising', against the potential for greater local and community engagement. The section will conclude with a critique of global, 'resilient cities' movement and its relevance to wider practice.

Section 4 will outline three key pillars for enhancing urban resilience, and outline the approaches through which they can be enacted. It is proposed that improvements to

a city's resilience should be built upon Risk Management within the built environment, whilst the Integrated Governance and Collaboration approach is underpinned by vertical and horizontal, governance integration and 'collaborative resilience' (Goldstein, 2012). A final approach based upon Holistic Urban Design, and its close associations with urban planning, outlines how the evaluation of design practice, building of adaptive capacity and new ideas through 'abductive' reasoning, can build wider resilience. Furthermore, as Corner (2004, p.1) argues, design practice itself has much to learn from the concept of resilience:

> *"In order to grow and develop, life forms must both persist and adapt, their organizational structures sufficiently resilient to withstand challenges while also supple enough to morph and reorganize. These principles are as topical today in business and management as they are in biology and ecology, urbanism and the design of public space."*

Finally, the chapter concludes with some critical reflections gleaned from this and earlier chapters, which will provide the conceptual lens to view resilience within the urban environment (Chapters 6 to 9).

4.2 CONCEPTIONS OF RESILIENCE

The word resilience originates from the Latin *resilire*, which broadly translates as 'to leap back' (Coaffee, 2013a). However, the use of the term today is often contested (Brown, 2013; Coaffee, 2006; Bosher, 2014; Vale 2013); aptly illustrated by Edwards' (2009, p.17) contention that an understanding of resilience based upon 'bouncing back' is "*too narrow, too short term and too reactive*", whist Shaw (2012) suggests

that we need to consider a more proactive conception of 'leaping forward'. This fixation with 'bouncing back' could be said to be emblematic of the normative view of resilience held in some academic circles.

Reflecting on this disputed usage, Bosher (2014, p.2) suggests that resilience *"means different things to different disciplines."* To illustrate this, Figure 4.1 below, lists a number of different disciplines and their corresponding use of the term resilience.

Figure 4.1 – Conceptions of Resilience by Discipline

Discipline	Loose Definition, Basis of Approach and Themes
Psychology	Individual ability to endure/respond to challenging life events and transitions. Also incorporates concepts of community and family resilience. (Zolli and Healey, 2013)
Ecology	The ability of a system to maintain function in response to disturbance; either through maintenance or return of stability (Holling, 1973, 1986).
Engineering	Mitigation and elimination of the vulnerability of people and places (Bosher, 2008).
Planning	Spatial and territorial responses to shocks which affect every-day life (Coaffee et al, 2008), including emergency planning.
Economics	How economies mediate shock and return to previous output levels in the shortest time (Martin, 2012).
UK Government Policy	*"...resilience means ensuring that the Country is prepared to detect, prevent and respond with speed and certainty to major emergencies, including terrorist attacks."* (ODPM, 2004, p.2)

(Source: compiled by author)

From an academic perspective, these differences can often appear significant, but on a practical level, they also offer similarities; broadly as ways to conceptualise

disturbance (Vale, 2013). In a similar way, concepts of vulnerability[39], redundancy[40], adaptation[41] and mitigation[42] are often used interchangeably with resilience; whilst there are important distinctions between these terms; they all contribute towards a more an integrated understanding of resilience.

Moreover, resilience is increasingly seen as relevant to addressing a spectrum of contemporary risks and concerns, as well as how they are conceptualised and practiced; these include security, disaster risk reduction, climate change adaption, water management, economic development and even community relations (Leichenko, 2011; Davoudi, 2012; Davoudi, et al., 2012; Scott, 2013; White, 2013; Stumpp, 2013).

In order to unpack a better understanding of resilience and thus its relevance to these seemingly disparate issues, it is helpful to explore the origins of the term resilience in academic practice.

[39] Vulnerability: "The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard." (UNISDR, 2012)

[40] Redundancy: "...the extent to which elements, systems, or other units of analysis exist that are substitutable, i.e., capable of satisfying functional requirements in the event of disruption, degradation, or loss of functionality" (Bruneau, et al, 2003, p.737)

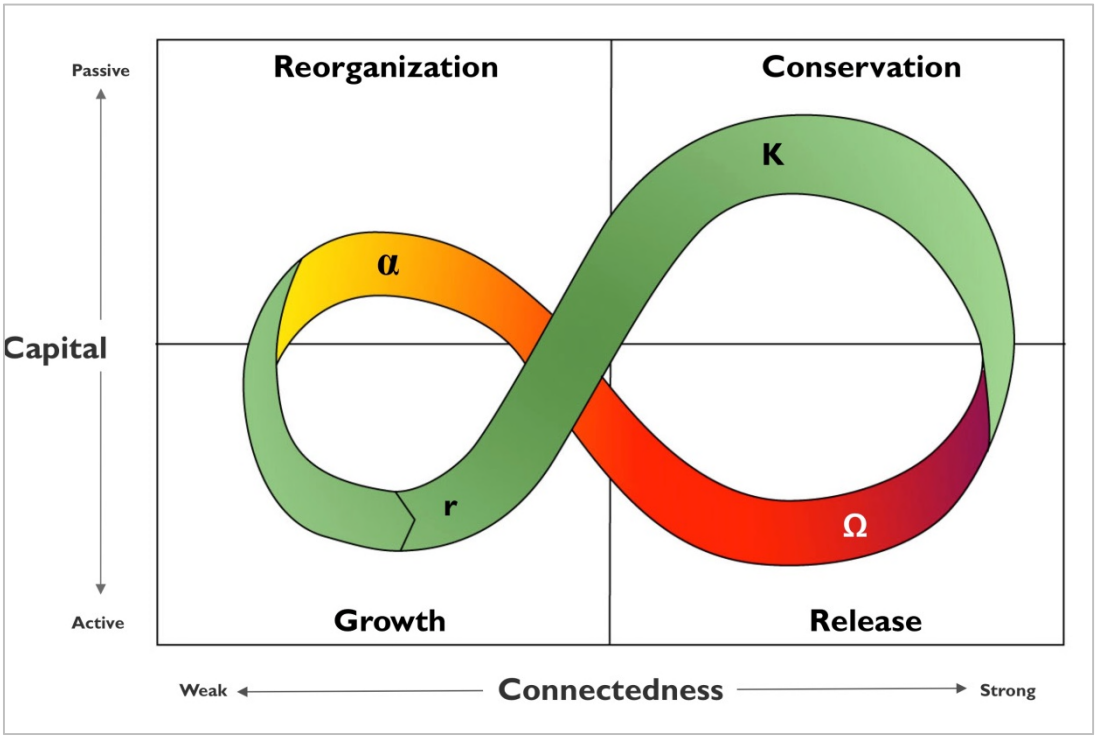
[41] Adaptation: "The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities."(UNISDR, 2012)

[42] Mitigation: "The lessening or limitation of the adverse impacts of hazards and related disasters." (UNISDR, 2012)

Resilience Origins

The contemporary use of resilience is broadly acknowledged to have emerged from C.S. "Buzz" Holling's 1970s studies of systems ecology and his work with the Resilience Alliance (Walker and Cooper, 2011; Zolli and Healy, 2013). Holling's ideas represented a paradigm shift away from earlier understandings of ecological systems, which assumed a stable equilibrium basis, instead demonstrating a more dynamic process which he termed the *"adaptive cycle"* (Adger, et al., 2005); see Figure 4.1 below.

Figure 4.1 – The Adaptive Cycle



(Source: Holling, 2001)

In essence, Holling's model proposed that external shocks, such as forest fires, created new opportunities for resource exploitation; thus the ability of species and

systems to persist, was based on their capacity to adapt whilst still maintaining core functions, in the face of this inevitable cycle of change (Holling, 1973, 1986). Walker and Cooper (2011, p.147) provide a summary of this process:

> *"Where classical systems ecology focused only on the phases of rapid successional growth (r) followed by the conservation phase of stable equilibrium (K), the Resilience Alliance argues that these phases are inevitably followed by collapse (Ω), and then a spontaneous reorganization that leads to a new growth phase (α)."*

Zolli and Healey (2013) suggest that understandings of the adaptive cycle can be helpful in many other settings, such as how businesses can exploit new markets, whilst Fisher's (2012) has suggested that designers can utilise an understanding of this model to improve resilience in the built environment (see 4.4).

Holling (Walker and Cooper, 2011) also introduced an alternative conception of resilience, which he termed *"engineered resilience",* to mean practices of resilience that are not informed by an understanding of system theories. Despite this rather derogatory implication, engineered resilience provides a useful term to describe more practical approaches to resilience, promoting mitigation and resistance to natural and man-made disasters. Whilst members of the Resilience Alliance, such as Gunderson and Holling (2002), have been critical of engineered resilience, which they argued is an attempt to maintain a false or fabricated equilibrium, this more grounded approach has parallels to the large body of literature that attempts to address the impact of 'natural' disasters and disruptive events (Coaffee 2009, Godschalk 2003, Bosher 2008), and which owe little to Hollings concepts of

resilience. Where the Resilience Alliance have a point is the way in which many of these practices have focussed on a narrow foci for resilience, ignoring wider benefits or negative outcomes in other policy areas (Coaffee, 2013a; Godschalk, 2003).

However, many of the more pragmatic approaches to resilience draw from practical experience and utilise risk based methodologies that display greater sophistication than proponents of ecological resilience would suggest (Fungfeld and McEvoy, 2012); how these methods have been enacted within public policy is explored within section 4.3. By contrast, the systems basis of ecological resilience, whilst well suited to the ecological context, is much less appropriate to social systems which are less easy to conceptualise with theoretical models (Alexander, 2013; Davoudi, 2012). Likewise, it could be interpreted that Holling's adaptive cycle presents resilience as an inevitable process of bouncing back[43], which is a potentially dangerous assumption for social systems. More widely, Mackinnon and Derickson (2011) have argued that these theoretical understandings of resilience are socially naive and in particular, overlook the role of economic forces.

These conceptions of ecological and engineered resilience provide the foundation of the contemporary understanding of the terms; with twin approaches of theory and practice, inductive and deductive methods emerging. Engineered resilience demonstrates the importance of grounded working, observations and reflections, whilst ecological resilience can be used to understand man's interaction with natural systems. Whilst proponents of ecological approaches argue that natural

[43] Walker and Cooper (2011) suggest that this understanding of the adaptive cycle was used by neo-liberal economists to promote how an unregulated financial system would be self-governing.

environments share many properties with the dynamic systems of the urban context, there is a dearth of research to support this proposition.

Significantly, Holling's work would have a profound effect on the emerging science of complexity (Walker and Cooper, 2011).

Resilience and Complexity

In the recent publication on resilience, "Rebound: Why things bounce back", Zolli and Healy (2013) suggest that many contemporary challenges, *"reveal the dependencies between spheres that are more often studied and discussed in isolation from one another."* To illustrate this, they use an example of how food shortages and social unrest in Mexico were triggered by US energy policy incentives to grow crops for biofuel. The point echoes the arguments of Giddens' (2002) and Beck (1992) that the majority of global risks and problems no longer adhere to the boundaries of nations or professions, and require new forms of collaboration to address them.

These sort of interconnected issues have sometimes been referred to as 'wicked problems' (Healey, 2012; Coaffee, 2013b; Porter and Davoudi, 2012), and are the inspiration for many of the governance innovations described within the previous chapter. In his critique of resilience as a means to manage increased complexity, Chandler (2014) argues that the complexity is a conceptualisation of 'uncertainty' and the limits of what can be scientifically quantified[44], which has increasingly become important since the 1920's. More widely, he argues that complexity is itself a critique of liberal forms of 'top down' government, an alternative to neoliberal

[44] In particular, Chandler highlights the emergence of 'chaos theory', which is a challenge to conventional deductive and model-based approaches to science.

approaches, and that an understanding of the medium of complexity, offers the secret to new forms of governance.[45]

Whilst Holling struggled to conceptualise social systems, other members of the Resilience Alliance would provide some illumination on the issue of complexity; most notably Frances Westley, who proposed three fundamental types of problem (or system), illustrated by Figure 4.2:

Figure 4.2 – Simple, complicated and Complex Problems

SIMPLE	COMPLICATED	COMPLEX
Baking a Cake	**Sending a Rocket to the Moon**	**Raising a Child**
The recipe is essential.	Rigid protocols or formulas are needed.	Rigid protocols have a limited application or are counter-productive.
Recipes are tested to assure easy replication.	Sending one rocket increases the like lihood that the next will also be a success.	Raising one child provides experience but is no guarantee of success with the next.
No particular expertise is required, but experience increases success rate.	High levels of expertise and training in a variety of fields are necessary for success.	Expertise helps but only when balanced with responsiveness to the particular child.
A good recipe produces nearly the same cake every time.	Key elements of each rocket must be identical to succeed.	Every child is unique and must be understood as an individual.
The best recipes give good results every time.	There is a high degree of certainty of outcome.	Uncertainty of outcome remains.
A good recipe notes the quantity and nature of the "parts" needed and specifies the order in which to combine them, but there is room for experimentation.	Success depends on a blueprint that directs both the development of separate parts and specifies the exact relationship in which to assemble them.	Can't separate the parts from the whole; essence exists in the relationship between different people, different experiences, different moments in time.

(Source: Westley, et al., 2006)

Westley, et al. (2006) make the important point that complex problems, which we are frequently facing when dealing with the social and technical considerations of

[45] Walker and Cooper (2011) have suggested that this understanding of complexity, as a result of the work of the philosopher, Hayek, also informs financial risk management.

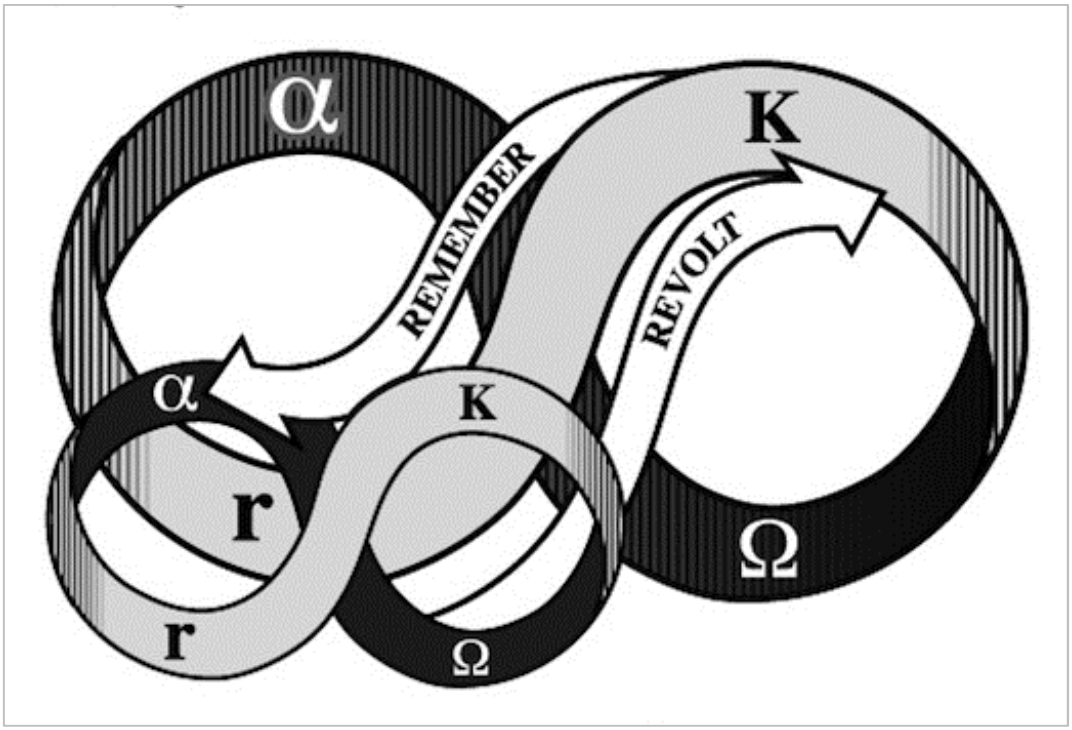
the built environment, inherently present uncertainties and non-linear outcomes, which make rigid theories and protocols unhelpful in tackling them. Further, that they require context specific approaches and continuous learning-by-doing.

In this context, cities, with their interaction between physical and social factors, are another complex system (Wilkinson, 2011). Perhaps climate change could be viewed as the ultimate complex problem, with many scientists working to uncover facets of this system, as a means to slowly understand the whole. Accordingly, complexity is best understood as a 'catch-all' for difficult and non-linear problems or systems, that cannot be easily modelled or addressed deductively; thus requiring a variety of information gathering or inductive approaches to unpick them.

Enhanced understandings of complexity would inform new models and understandings of ecological resilience, in particular Gunderson and Holling's (2002) "Panarchy"; an updated hierarchy of adaptive cycles, named after the Greek god Pan, who is "*the epitoma of unpredictable change"* (Holling, 2001, p.396). The Panarchy attempts to reconcile some of the limitations and contradictions of the earlier theories, by providing phases that are neither fixed nor sequential, rather operating as multiple, nested adaptive cycles which function and interact independently (Davoudi, 2012);[46] see Figure 4.3, below.

[46] The Panarchy also recognises that internal functions can introduce change, as in social systems, in effect working from the bottom up as well as top down (Allen, et al., 2014)

Figure 4.3 – The Panarchy



(Source: Resilience Alliance, 2012)

Whilst the Panarchy is an interesting model, it is not necessarily particularly helpful in illuminating the motivations of social systems and their interaction with the environment; other than proposing that they are complex, interlinked and nigh on impossible to predict in practice from theoretical models. It is a model that illustrates the limitation of such models.

Together with the earlier definitions of resilience, these new conceptions of resilience and complexity can appear disparate and confusing. However, in echoes of Vale's comments on the similarities of resilience definitions, Zolli and Healey (2013) suggest there are commonalities around approaches to address *"continuity and recovery in the face of change"*. In particular, they describe 'adaptive capacity' as the key to this:

"adaptive capacity – the ability to adapt to changed circumstances while fulfilling one's core purpose – and it's an essential skill in an age of unforeseeable disruption and volatility."

These commonalities are at the heart of what is now termed, "Resilience Thinking".

Resilience Thinking

"Resilience Thinking" was first termed by Walker and Salt (2006, p.10) in their publication of the same name, which they describe as:

"Resilience thinking presents an approach to managing natural resources that embraces human and natural systems as complex systems continually adapting through cycles of change."

More recently, they have attempted to translate these ideas into implementable principles that can be put into practice in a variety of different contexts. Walker and Salt (2012, p.3) propose 10 key points as the "essence" of resilience thinking:

"1. The systems we are dealing with are self-organizing.

2. There are limits to a system's self-organizing capacity.

3. These systems have linked social, economic, and biophysical domains.

4. Self-organizing systems move through adaptive cycles.

5. Linked adaptive cycles function across multiple scales.

6. There are three related dimensions to resilience: specified resilience, general resilience, and transformability.

7. Working with resilience involves both adapting and transforming.

8. Maintaining or building resilience comes at a cost.

9. Resilience is not about knowing everything.

10. Resilience is not about not changing."

Broadly, these points look to translate theory into practice. However, the critical point for Walker and Salt (2012) is that resilience is not about fixed outcomes, rather it is a process. This echoes Corner's (2006) and Carmona's (2014) contentions that urban design is an ongoing process of generating space 'physically, socially and economically.' There are also parallels between the essential role of adaptation in resilience thinking and Chandler's (2012) advocacy of reflexive policy and governance, as well as the linked nature of 'social, economic and biophysical domains' and the need for integration and holistic governance (6 et al., 1999; Newman, 2001; Healey, 2002). In further echoes of Chandler's argument, there is coalescence of ideas around resilience, place making and governance.

It is also notable that Walker and Salt link resilience thinking to sustainability; earlier publications on resilience also attempted to reconcile the concept with ideals of sustainability (Holling, 2001). More recently however, there is an increasing acknowledgement that resilience is replacing sustainability as the central organising concept of the age (Deshkar, et al., 2011; Fungfeld and McEvoy, 2012; Porter and Davoudi, 2012; Vale, 2013; Zolli and Healy, 2013; Brown, 2013; Imrie and Lees, 2014).

Resilience as the New Sustainability

The publishing of "Our Common Future", authored by Gro Harlem Brundtland (1987), brought the concept of sustainable development, and accordingly sustainability, to international prominence and established a universally utilised definition for the concept:

> *"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs".*

Produced amid mounting fears of global warming, it promoted the notion that societies needed to reduce their impact upon the natural world or face environmental catastrophe at some time in the indistinct future. To put this into perspective, Rydin (2010) argued that sustainability represented the most important policy goal of the early 20th Century[47], whilst the literature review of urban design also identified that improving sustainability had been integral to the urban renaissance and that urban design had been instrumental in promoting this agenda (Punter, 2011).

However, in the almost 30 years since the Bruntland report was published, the world context has changed; as Zolli and Healy (2013) elaborate:

> *"Each week, it seems, brings some unforeseen disruption, blooming amid the thicket of overlapping social, political, economic, technological, and*

[47] Whether this is still the case after the international economic crash of 2008, is debatable.

environmental systems that govern our lives... Volatility of all sorts has become the new normal, and it's here to stay."

Recent years have seen significant social and environmental volatility and disruption which have challenged the primacy of sustainability as an organising metaphor for the urban and built environment. A cynic might suggest that the need for resilience is the inevitable product of political failures to tackle social problems, prepare for natural disasters or most critically attempt to address man-made, climate change (IPCC, 2014; UNISDR, 2012).

In an article for the *New York Times*, Zolli (2012) tells an anecdote about the impact of Hurricane Sandy upon the city's built environment, noting how the many LEED[48] Certificated buildings found in Lower Manhattan would be almost universally the most badly affected by the storm and flooding. In essence, this parable describes how sustainable buildings are designed to minimise their impact upon the environment, but have failed to consider how the environment impacts upon them. Zolli (2012) further provides a neat definition of the difference between the two approaches:

"Where sustainability aims to put the world back into balance, resilience looks for ways to manage in an imbalanced world."

This quote has echoes of Giddens (2002) metaphor of the globalized world as an out of control, 'juggernaut'. Fundamentally, where sustainability assumes a present and future of equilibrium, resilience is based upon a change paradigm, which makes it

[48] Leadership in Energy and Environmental Design (LEED) is a green building certification program from the USA, but has international recognition.

particularly helpful for managing a complex and uncertain future. Increasingly these uncertainties are focussed upon the contemporary city, with the result that resilience policies and theories are increasingly urban in orientation (Coaffee, 2013a, 2013b; UN-HABITAT, 2011; UNISDR, 2012; Godschalk, 2003).

Urban Resilience

The introduction to this thesis outlined the critical importance of the city to human life in the 21st Century, as a result of their concentration of population and economic activities (Glaeser, 2011; Florida, 2002), but also outlined the lengthening list of risks that threaten them, particularly given the potential impact of climate change (Beck, 1996; Bosher et al., 2007a, 2007b; Coaffee, 2009; Fisher, 2012). Cities provide an interesting paradox; they can shelter and insulate us from the local environmental consequences of human actions, but they produce a convergence of vulnerabilities, risks and threats (Edwards, 2009; White, 2008). Reflecting on the significance of this within the UK, Edwards (2009, p.9) observed:

> *"Over 80 per cent of Britons live in urban areas relying on dense networks of public and private sector organisations to provide them with food, water, electricity, communications and transport. For much of the time this lifestyle poses us few challenges, but it relies on an infrastructure that is outmoded and archaic, and which increasingly lacks the capacity to support our complicated lives."*

Edwards (2009) further suggested that the *"brittle system"* of critical infrastructure, delivered through network governance and which underpins our current way of life,

is highly vulnerable to disturbance and what we often term, disasters. This is well illustrated by the events of 9/11, where the heightened threat of global terrorism has had a significant impact upon Western societies and cities (Coaffee, 2006, 2009), accelerating a push towards greater security and a range of policy and physical measures. In addition to this, recent years have also seen increasing extreme weather and environmental events (Zolli and Healey 2013; Godschalk, 2003, White, 2013), which have tested the foresight and coping mechanisms of people and places across the globe.

It is within this context that the need for urban resilience becomes clear. Leichenko (2011, p.164) offers a simple definition of urban resilience, which is broadly concomitant with a cross section of views on the subject:

> *"Urban resilience generally refers to the ability of a city or urban system to withstand a wide array of shocks and stresses."*

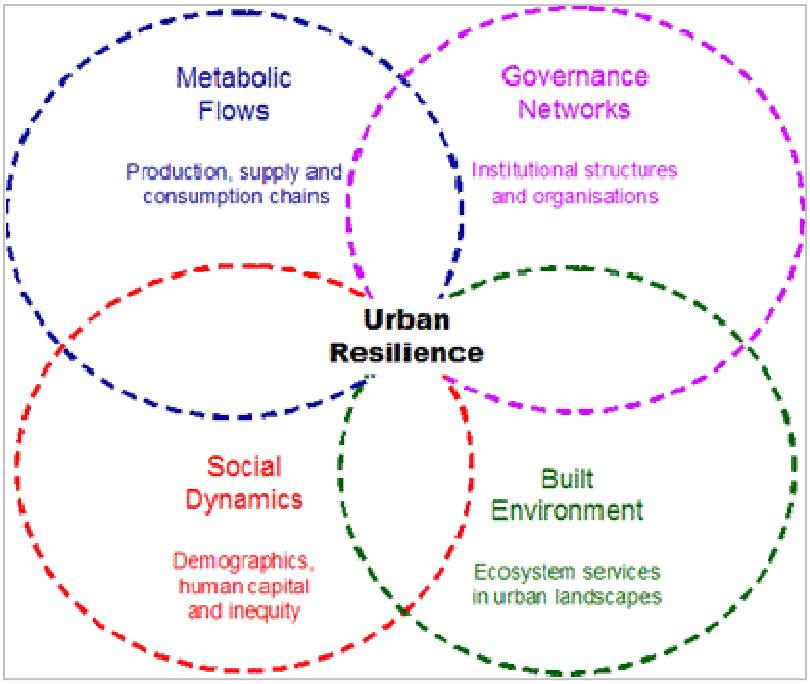
The idea of 'capacity' is one way in which Leichenko's rather simplistic definition of urban resilience is being expanded to encompass new forms of theory and practice; as this thesis will further explore.

Conceptualising these capacities as dynamic flows and ongoing dialectics between social, economic and environmental processes, as well as the linked functions of urban governance and the built environment, is how the Resilience Alliance (RA) [49] have defined urban resilience. Inspired by Holling's ecological theories and models, the RA propose that urban resilience can be illustrated through the use of a Venn

[49] The Resilience Alliance is a research organization comprised of scientists and practitioners from many disciplines who collaborate to explore the dynamics of social-ecological systems (RA, 2014).

diagram (see Figure 4.4, below). However, as with other ecologically formed theorisations of resilience, it remains a rather abstract representation.

Figure 4.4 – Illustration of Urban Resilience



(Source: The Resilience Alliance, 2012)

By contrast, the wider application of urban resilience in public policy has largely been adopted and evolved from security discourses, developed in the years following the attacks of 9/11 (further explored in Section 4.3), and applied more widely to an ever-increasing range of risks and practices; as Coaffee (2013b, p.2) elaborates:

> *"Emerging in the UK predominantly as a policy connected to countering the threat of international terrorism, resilience has now further expanded as a policy metaphor for embedding 'foresight', robustness and adaptability into a variety of place-making and localist planning activities."*

Furthermore, this move towards urban resilience in public policy involves a critical engagement with the subject of risk assessment and management (Coaffee, 2013a, 2013b; Vale, 2013).

4.3 THE RESILIENCE TURN IN URBAN POLICY

The previous section identified how understandings of resilience, particularly the policy and practice that attempts to address disruptive events, are closely related to the assessment and management of risk. Appropriately, Giddens (2002, p.22) elaborates how, much like resilience, the concept of risk requires a nuanced understanding:

> *"Risk isn't the same as hazard or danger. Risk refers to hazards that are actively assessed in relation to future possibilities… "*

This emerging interest in risk and resilience has developed from the critical appraisal of risk and its impact upon contemporary society which took place during the 1980's and 1990's, most notably by German sociologist, Ulrich Beck (Coaffee, 2009). Beck would argue that the distribution of wealth within society was increasingly tied to the unequal spatial distribution of risk, (Coaffee, 2009); Beck (1992) termed this the 'risk society'.

In echoes of this, Giddens (2002) has argued that previous generations redistributed risk across society (if not always equally) through insurance, but that this social contract changed with the rise of *"manufactured risk"*; risks which are man-made, including climate change and global terrorism, and which are difficult to predict or insure against. Accordingly, and in response to global incidents, disasters and the

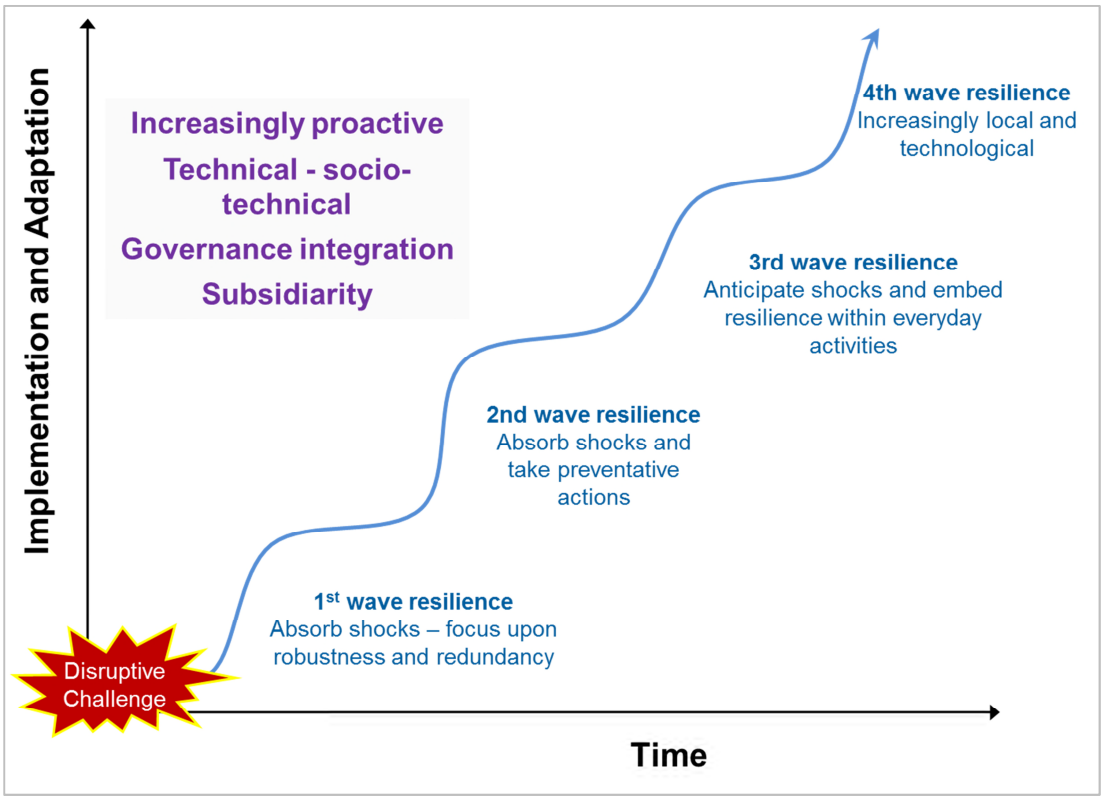
prevalence of ‘manufactured risks’, resilience practice has arisen as the antidote to the interdependency and complexity of contemporary risk (Coaffee, 2006, 2009; Linkov et al., 2014).

Thus, the broader story is the shift from this theoretical understanding of risk to the more grounded appreciation of resilience, responding temporally to global incidents and national policy priorities. This process is critical to the so-called ‘resilience turn’ in urban policy (Coaffee, 2013b); the significance of which is clearly articulated by Lees and Imrie (2014, p.305):

> *“… it now seems that urban sustainability is going out of fashion and ‘urban resilience’ is the new buzzword for cities around the world… We are in the midst of a resilience turn, and urban sustainability may be reaching the end of its shelf life, because it is being challenged, from without, and within.”*

Recently, Coaffee (2013b) has proposed that urban resilience policy has been rolled out in a series of ‘waves’; these do not necessarily represent a linear sequence, rather they illustrate how policy initiatives have evolved over time. Accordingly, Figure 4.5, below, shows how these waves are often stimulated by disruptive challenge, becoming increasingly pro-active and increasingly technical or indeed, socio-technical, more localised and necessitating more integration of governance functions.

Figure 4.5 – 'Waves' of Resilience Policy and Practice



(Source: Coaffee and Clarke, 2014)

These waves demonstrate how national policy priorities change over time, whilst also offering a broad measure of the sophistication of resilience approach. Although the resilience turn has been a global trend (Coaffee, 2013a and 2013b), policies for dealing with disruptive challenges differ between nations, being shaped by historic policy developments and national governance structures (Handmer and Dovers, 2011). Accordingly, the following section will explore the temporal nature of resilience policy within the UK, which is the primary location of the study's embedded case studies.

The Evolution of UK Resilience Policy

Prior to 2000, local governments, spatial planners and urban designers had not really engaged with ideas of resilience, and the term was seldom used in urban policy circles (Coaffee, 2013a, 2013b). However, the World Trade Centre attack on September 11th 2001 would mark a turning point in the resilience discourse, with an increased realisation that urban locations could be a potential target for terrorists and thus physical measures would need to be integrated into the design of the built environment to address these vulnerabilities (Coaffee, 2009).

This would be manifest in the *"fortress-like security at high risk sites"* (Coaffee, 2013a, p.8) seen in the UK and USA, and perhaps best characterised by Benton-Short's (2005) *"bollards, bunkers, and barriers"*. The period would also see an accentuation of earlier security trends, with a return to Newman's ideas of Defensible Space and a general hardening of the public realm (Coaffee, 2009). Similarly, policies intended to improve the robustness of buildings and public spaces to terrorist attack, would also overlap with measures to improve urban security seen during the UK's Urban Renaissance (Rogers and Coaffee, 2005; Oc and Tiesdell, 1997)[50]. These reactive and often intrusive interventions in the public realm, exemplify Coaffee's 1st wave of resilience, which crudely attempts to absorb shocks with material interventions and technical solutions, driven by a narrow range of actors and exemplifying the 'engineered resilience', discussed earlier in the Chapter (Walker and Cooper, 2011).

[50] Atkinson (2006, p.171-172) suggests that as policy makers sought to persuade the professional classes to return to central urban areas, they were often *"cossetted with greater security*", utilising a host of crime reduction measures within the built environment, such as CCTV, barred windows and gated communities; ironically, these measures would often exaggerated resident's sense of risk.

In parallel to this, there would be concerns raised about the increasing privatisation of public spaces (Minton, 2009), exemplified by Rogers and Coaffee's (2005) description of how congregations of young people would be barred from Newcastle's privatised shopping spaces. These anxieties would echo the wider problems of how to protect national infrastructure following the hollowing-out and privatisation of many state functions (See Chapter 3). Following the severe impacts on the national economy caused by disruptive events including, the 2000 fuel protests, foot and mouth disease, as well as a number of severe floods (Coaffee, 2013a); Government ministers would raise concerns about the *"significant disconnect"* between national co-ordinators and the local-level led, incident response (Brassett and Vaughan-Williams, 2013, p.230). Consequently, in the UK resilience would emerge as a wide-ranging policy initiative to address the threat of international terrorism and to initiate emergency planning reform (Coaffee, 2013b).

The 2004 Civil Contingencies Act (CCA) would attempt to address these concerns by introducing a new multi-level, multi-hazard resilience governance system, across national, regional and local levels (Coaffee, 2013a, Brassett and Vaughan-Williams, 2013). Prior to this, responsibility for emergency planning and civil contingencies was held by the Home Office Emergency Planning Department, with 'fragmented' local connections (Coaffee et al., 2009). The act would also introduce the term resilience into a wider context of UK policy and practice.

The key aim of CCA was to create a common framework for local and regional organisations to address issues of emergency planning, through the creation of Local Resilience Forums (LRF) and Regional Resilience Forums (RRF). More specifically, it

mandated local and regional partnerships, requiring multi-agency collaboration and gave the designated responders set roles, responsibilities and standards. Importantly, these emergency response procedures were informed by regular risk assessments and exercises, whilst there was also a duty for LRF's and RRF's to raise public and business awareness of emergency planning and continuity. The initial regional focus for resilience work within CCA would be significant given the much later abandonment of regional governance by the Coalition Government.

The CCA approach would mark a shift in application from physical measures, designed to increase the robustness to a specific hazard or threat, towards a more people-based governance system, designed to prepare for disruptive challenge, manage risks and taking preventative action. Whilst this approach mirrors Coaffee's 2nd 'wave' of resilience, it also demonstrates a "re-scaling" of responsibility; in this case some responsibility for emergency preparedness moved from central government down to a regional, and later local, level.

One of the key foci for the CCA has been flooding, which has emerged as the UK's most significant threat to lives, business and infrastructure, as a result of major flooding events; most notably in 2000, 2007 and 2013/14 (Scott, 2013); it remains a priority within the UK's latest *National Risk Register* (Cabinet Office, 2015). It is White's (2013) contention that earlier strategies for dealing with flood risk failed because they relied too much on quantitative measures, which were too dependent on where flooding had previously occurred, and thus insufficiently forward looking, proactive or resilient. He illustrates this using Figure 4.6, shown below, which

highlights the numbers of properties quantified by the Environment Agency as being at risk of flooding, which grew over time and in response to new flood events.

Figure 4.6 – Properties at Risk of Flooding in the UK by Year

Year	Estimated properties at risk by source				Total
	Rivers and sea	Surface water	Groundwater	Reservoir Failure	
2001	1,724,225	0	0	0	1,724,225
2004	1,740,000	80,000	1,700,000	0	3,420,000[1]
2009	2,400,000	3,800,000	1,700,000	0	6,800,000[2]
2011	2,400,000	3,800,000	1,700,000	1,100,000	7,900,000[2]

(Source: White, 2013)

The flooding which struck the UK in the summer of 2007 would be the most serious that the nation had faced since 1947, resulting in 13 deaths, inundation of around 48,000 homes and 7,300 businesses, as well as billions of pounds of damage (Pitt, 2008; White, 2013); it would also have a major impact upon wider resilience policy. The subsequent review into the causes of flooding, headed by Sir Michael Pitt (2008), would highlight the role that surface water flooding had played in the disaster, as well as unchecked housing developments within flood plains, many of which had been built during the urban renaissance of the 1990's; highlighting failures within planning and wider development practices.

Pitt (2008) made almost 100 recommendations within the report, largely focusing on governance and organisational issues, but significantly he also stressed the importance of individuals and communities taking responsibility for flood management. Consequently, Table 4.1, below, shows some of the key recommendations from the Pitt review with particular significance for this study:

Table 4.2 – Summary of Pitt Review Recommendations on UK Flooding

No.	DETAILS
1	*Given the predicted increase in the range of future extremes of weather, the Government should give priority to both adaptation and mitigation in its programmes to help society cope with climate change.*
2	*The Environment Agency should be a national overview of all flood risk, including surface water and groundwater flood risk, with immediate effect.*
7	*There should be a presumption against building in high flood risk areas, in accordance with PPS25, including giving consideration to all sources of flood risk, and ensuring that developers make a full contribution to the costs both of building and maintaining any necessary defences.*
9	*Householders should no longer be able to lay impermeable surfaces as of right on front gardens and the Government should consult on extending this to back gardens and business premises.*
10	*The automatic right to connect surface water drainage of new developments to the sewerage system should be removed.*
11	*Building Regulations should be revised to ensure that all new or refurbished buildings in high flood-risk areas are flood resistant or resilient.*
15	*Local authorities should positively tackle local problems of flooding by working with all relevant parties, establishing ownership and legal responsibility.*
20	*The Government should resolve the issue of which organisations should be responsible for the ownership and maintenance of sustainable drainage systems.*
21	*Defra should work with Ofwat and the water industry to explore how appropriate risk-based standards for public sewerage systems can be achieved.*

Source: Pitt (2008)

Significant to the wider practice of resilience, Pitt recognised that design, governance (including planning) and ongoing management, were all vital to addressing flooding; he also attempted to integrate responsibilities, that were often unclear or split

between many stakeholders, within single organisations. The subsequent 2010 Flood and Water Management Act would attempt to address some of his recommendations, shifting responsibility for surface water drainage from the Environment Agency, a central Government quango, to top-tier local authorities; so-called Lead Local Flood Authorities (LLFA). Consequently, LLFA's are required to lead the strategic management of local flood risk and to look for ways to reduce this risk through a variety of means, including sustainable drainage systems (SuDs)[51] and critically, helping communities manage their own risks and become more flood resilient.[52]

This approach, which utilises rescaling and devolving of functions to local stakeholders, integration of policy responsibilities, and an attempt to make resilience a part of wider, 'everyday practice', is a move towards Coaffee's 3rd 'wave' of resilience. Within the built-environment sector, this would typically involve building in resilience functions to other material considerations (Coaffee, 2013a) and from here a range of tensions emerge.

Evaluating the current state of UK resilience policy, Bosher (2014, p.9) has suggested that there is a wider culture of *"planning to respond,"* as opposed to *"planning to reduce or eliminate"* emergency events; in effect adoption normative approaches that do not challenge the present status quo or consider a different future. Much of

[51] SUDs is based on green infrastructure and soft landscape to encourage infiltration of water into the soil, replacing the hard infrastructure of pipes and gulleys used in conventional systems of drainage, which can exacerbate flooding events (CIRIA, 2007). SuDs also offers wider benefits by providing more green space and potentially a more attractive environment.

[52] In echoes of this, the National Counter-Terrorism Security Office (NaCTSO) would attempt to engage planners and designers in the process of managing terror threats, through the use of built environment training sessions and design/planning guidance, such as "Crowded Places: The Planning System and Counter-Terrorism (Home office, 2010). Local Authorities would have a duty to consider these publications in the planning process, although research by Coaffee and Bosher (2008) indicated they were not widely doing so.

this can be traced to the way in which emergency stakeholders and built environment professionals operate in silos and do not work together (Bosher et al., 2007a), compounded by the limited understanding of other stakeholders' roles and objectives, as well as poor timing of key decisions and unclear responsibilities. More positively, the CCA approach has successfully evolved into more everyday practice, principally through the work of Local Resilience Forums (LRF), whose responsibilities have grown in recent years (Coaffee, 2013a). Reflecting on these successes, Brassett and Vaughan-Williams (2013) suggest that making stakeholders regularly work together, builds a form of community resilience; in effect what they are describing is how the LRF forms a 'soft space', where informal processes of governance are key (Haughton et al., 2010). However, they also noted that there were new pressures on emergency response in an era of budget cuts and austerity, as well as the loss of regional governance tiers which were critical to the CCA's conception. Furthermore, the LRF's work is within a separate horizontal area of governance to urban planning systems and thus development processes; notably, Fisher et al (2015) suggest that planners and the emergency planners within the LRF rarely work together, in spite of the obvious benefits from doing so.

The LRF's work on emergency preparedness is bolstered by outreach programmes, intended to educate stakeholders on risk, engage in training exercises and prepare continuity plans. Coaffee et al. (2009, p.231) have suggested that this outreach work seeks to further rescale responsibility towards community, business and individual levels through 'responsibilising' and engaging them in the process of risk management:

> *"... policy increasingly encourages the development of community or institutional resilience, and the development of the 'responsible citizen', where the state passes responsibility to others as a supplement to more detailed institutional strategies."*

The degree to which urban resilience involves 'rescaling' and 'responsibilising' town communities and citizens, often shifting accountability away from governments and formal institutions, reveals a wider tension beyond UK practice.

Urban Resilience and Neo-liberal Tensions

> *"Looking closely the concept of resilience mutated from an instrument to improve human development (Madsen/Obdradovic 2008) toward an ideology trying to persuade people that their own fault, their weakness, their vulnerability, or even worse their lack of resilience, when they are hit by disasters or other mishaps."*
>
> (Dombrowsky, 2010, p.4)

Dombrowsky's quote, above, outlines the concerns held about resilience by a variety of authors; principally, that it is a 'neo-liberal' ploy for further state hollowing-out and a shifting of risk towards citizens, driven by government austerity (Amin, 2011; Theodore and Peck, 2011; Joseph, 2013; Slater, 2014). Within this context, earlier rescaling of state functions highlighted the dangers of *"responsibility without power"* (Peck and Tickell, 2002, p.386), where stakeholders lacked the resources to service their newfound responsibilities.

More critically, Joseph is explicit that, *"resilience is a form of governmentality"* (2013, p.38); in effect, that there is a hidden agenda, understood through Foucauldian theories, that attempts to 'instrumentalise' citizens through what Raco and Imrie (2000, p.2201) described as the manipulation of *"mentalities, norms, aspirations and actions of members of the population with the objectives and techniques of (advanced liberal) government."* Coaffee (2013b) acknowledges the role that 'governmentality' has played in the 'rescaling' and 'responsibilising' of resilience, but argues that this has been primarily linked to the security agendas around international terrorism and for which the term, resilience, offers a more positive way of framing the topic, as opposed to a wider conspiracy for further state retrenchment.

However, as Edwards (2010, p.57) noted, *"every emergency is local"*; whilst Godschalk (2003) goes further to suggest that an 'engaged citizen' is the key to a resilient city and UNISDR (2012) guidance emphasises the role of individual risk management in enhancing wider resilience. What becomes clear, is the extent to which a delicate balance exists between 'giving away' responsibilities better held by the state, against how more localised accountability can empower communities; a point which Brown (2013, p.7) outlines:

> *"Counter to the arguments about resilience as supporting regressive and neoliberal agendas, resilience is being used as an organizing principle by communities to challenge the status quo and to design and shape alternative futures. The Transition Towns movement is an exemplar..."*

Perhaps there is a danger in the current political and economic climate that building resilience, or capacity to cope with shocks, could be seen as an alternative to preparedness, forward planning and state involvement, particularly within vulnerable communities. Similarly, the culture of 'planning to respond', identified by Bosher (2014), could be said to highlight how normative approaches to resilience overlook necessary adaptions. This issue highlights the importance of resilience approaches that are holistic and forward looking (Coaffee, 2013b; White, 2013; Bosher, 2014); from a societal perspective Vale (2014) argues that the resilience of a community is only ever as strong as its weakest link, and thus it is necessary to address interlinked considerations, including social vulnerability.

However, there is wider agreement that debates around resilience are often uncritical and depoliticised (Coaffee, 2013a, 2013b; Porter and Davoudi, 2012; Joseph, 2013; Mackinnon and Derickson, 2011; Vale, 2014). Furthermore, Mackinnion and Derickson (2011, p.258) have suggested that this depoliticising of policy can lead to social inequalities being *"glossed over"* as a result. This is disputed by Vale (2014) who argues that resilience initiatives are vital for wider equity, but acknowledges that where resilience efforts are targeted is inherently political.

The political implications of resilience theory have been recently explored by Chandler (2014, p.47), which he has described as, *"the new art of governing complexity";* far from being a tool of neo-liberalism, he argues that resilience offers an alternative to the existing liberal, 'top down' government norms. Chandler's (2014, p.54) contention is that post-war governments struggled to cope with the complexity of society in a traditional top down way, and that neo-liberal approaches

overtook them under the assumption that the market would act as a *"deus ex machina"*[53], that effectively grounded policies, *"without the need for conscious reflection."* So as neo-liberal approaches have failed, he argues that an understanding of resilience, underpinned by understandings of complexity, offers a new framework for 'bottom up' governance. Whilst not exploring this hypothesis too deeply, Chandler (2014, p.57) does provide an interesting argument about the role of policy failure and learning, within the emergent resilience governance paradigm:

> *"Resilience-thinking tells us that policy failure is, in fact, 'not a failure of policy' but a learning opportunity with regard to the systemic process of unintended consequences and side-effects in a complex world, where failure enables policy-makers to learn from the revelation of these concrete and emergent interconnections."*

These meta-debates, theories about the theories of resilience, appear to reflect a parallel trend, away from the more localist trajectory described within Coaffee's 'waves', towards a more high level understanding of resilience; this second direction for resilience practice is exemplified by the more strategically focussed, resilient cities initiatives, which operate at a more supranational level.

Resilient Cities

Initial work within the field of urban resilience attempted to understand its importance to urban policy (Coaffee, 2006; Coaffee et al, 2008; Bosher, 2007; Ahern, 2011; Resilience Alliance, 2007), but more recently guidance for implementing urban

[53] From the Latin, broadly meaning 'machine of the gods', but popularised to mean an unlikely or improbable plot device within a work of fiction.

resilience has emerged from a variety of NGO sources and private companies; and which has coalesced around the aim of creating, "Resilient Cities."

At the forefront of this initiative is the United Nations Office for Disaster Risk Reduction (UNISDR), whose publication, *"How To Make Cities More Resilient: A Handbook For Local Government Leaders"* (UNISDR, 2012) provided guidance on urban governance, decision making and organization for disaster risk reduction and resilience enhancing activities. It is based upon the premise that it is at a local/city level that resilience practice is most needed, and identifies local government practice as both the primary mechanism and barrier to doing so. This rather high-level approach is closely associated with global development initiatives and disaster risk reduction (DRR). More practically, 'How To Make Cities More Resilient' lists ten 'essentials' for making cities resilient; but the cornerstone of these is the need to establish a full understanding of risk, including specific hazards and vulnerabilities.

> *"Risk assessments provide local authorities, investors and the general community with vetted and updated data, maps and other information on hazards, vulnerabilities and risk in order to take decisions regarding timely interventions before, during and after a disaster."*
>
> (UNISDR, 2012, p.33)

In a similar vein, the World Bank (2012) has produced guidance on urban resilience which also recommends a risk-based approach for local decision-making. Whilst these NGO sources of practical guidance are quite informative, they feel tailored to a developing world context which lack good government, public infrastructure or co-

ordination, and which is particularly vulnerable to very severe natural disasters. However, more recently the developed world is also beginning to look more seriously at ways to enhance urban resilience.

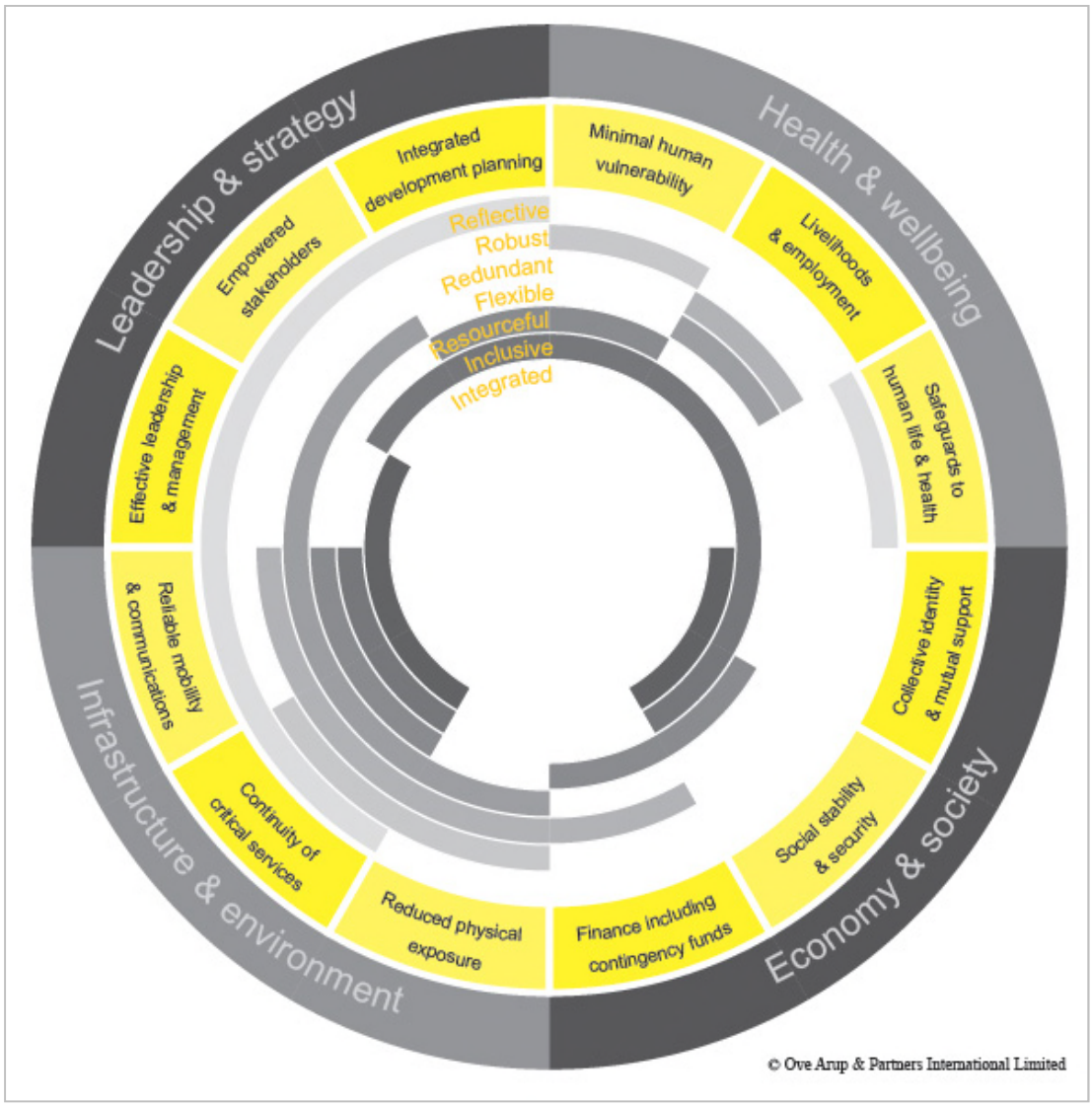
Most notably, the Rockefeller Foundation[54] is at the forefront of global resilience initiatives with is '100 Resilient Cities' (100RC) programme, which aims to work with 100 cities around the world to help to improve 'four kinds of value':

> *"1) Financial and other support for putting in place a new city resilience leader, a Chief Resilience Officer;*
>
> *2) Support for development of a robust resilience strategy;*
>
> *3) Management of a peer-to-peer network of member cities who can learn from and help each other; and*
>
> *4) Connections to solutions, service providers, and other partners who can help cities implement their resilience strategies."*
>
> (100RC, 2014)

This fourth 'value', which looks for external solutions and service providers, seems most significant. Increasingly a range of smart platforms for resilience are emerging from multinational technology and consultancy firms; most notably ARUP, who have produced the City Resilience Framework (CRF), on behalf of the foundation (see Figure 4.7, below) and Siemans, who have produced infrastructure modelling technology, including power and water, which integrates within this framework.

[54] The Rockefeller Foundation is one of the world's largest philanthropic foundations (formerly the biggest) and a significant NGO on global development.

Figure 4.7 –City Resilience Framework



(Source: Rockefeller Foundation and ARUP, 2014)

Whilst organisations like the Rockefeller Foundation and the UNISDR are doing important work, particularly at promoting resilience within urban governance, it could be argued that this shift away from central government responsibility towards global organisations utilizing private resources, emphasizing individual administrations 'choice' to opt into different tools, is itself something of a neo-liberal approach. That these organisations could be taking power and expertise away from

local government institutions, which the UNISDR identifies as critical to building resilience, seems to represent a paradox within the approach. Further, this 'professionalising' of resilience, risks taking the concept out of the hands of ordinary practitioners, as Punter (2010) noted had occurred with urban design.

More recently, many of these global resilience organisations came together to sign the "Medellin Collaboration on Urban Resilience". Amongst the agreements made was a commitment to the primary objective of "fostering harmonization of the approaches" (UN-HABITAT, 2014); in effect, this appeared to be about agreeing common terms and metrics. Otherwise, the practical relevance of this collaboration was unclear, but it could be interpreted as a form of 'land grab' of the term urban resilience; given the involvement of private organisations, this is potentially a worrying turn.

In spite of these concerns, the various resilient city initiatives has moved on the understanding of urban resilience, in particular the need to engage with proactive risk management; accordingly and as others have noted, urban resilience requires enhancement of urban planning and design techniques to make cities more resistant to exogenous shocks (Coaffee, et al., 2008), to embed proactive planning, foresight and preparedness in this process (O'Brien and Read, 2005), and to engage the built environment with the active management of risk (Coaffee and Bosher, 2008). Finally, whilst the resilient cities approach has illustrated the importance of the local governance context to enhanced resilience, as well as having produced some helpful guidance and tools for this scale, it is critical that the approach does not lead to

rescaling power away from local government institutions or to promote further hollowing out of the state.

4.4 KEY APPROACHES FOR ENHANCED URBAN RESILIENCE

> *"Resilience is the ability of a system to survive and thrive in the face of a complex, uncertain and ever-changing future. It is a way of thinking about both short term cycles and long term trends: minimizing disruptions in the face of shocks and stresses, recovering rapidly when they do occur, and adapting steadily to become better able to thrive as conditions continue to change. A resilience approach offers a proactive and holistic response to risk management and a way for cities to maintain competitiveness in the global forum."*
>
> (Siemans, 2013b)

This quote, taken from Siemans' *"Toolkit for Resilient Cities",* concisely outlines the significance of resilience to the urban context, importantly noting the importance of long-term thinking and change, but also highlights, with its mention of 'cities' and 'competitiveness', the pervasive dominance of financial and entrepreneurial concerns within the urban governance medium. Moreover, this toolkit could be considered an attempt to bridge the 'implementation gap' between theory and practice, which this chapter has highlighted around resilience and urban resilience. Accordingly, it is the purpose of this section to explore some practical principles of implementing urban resilience, in the style of Walker and Salt's 'Resilience Thinking' and utilising urban design and governance considerations.

Earlier sections have highlighted how the burgeoning work on urban resilience in both academic, policy and practice arenas, have identified a number of key 'pillars' which are brought together by a range of stakeholders, at multiple scales, to pursue resiliency objectives within urban policy and practice. These pillars also display congruences between resilience and the key findings of earlier chapters on urban design and urban governance. These 'pillars' are:

- Risk Management,
- Integrated Governance and Collaboration, and
- Holistic Urban Design.

Risk Management

> *"Risk analysis and assessments are essential prerequisites for informed decision making, prioritizing projects, planning for risk reduction measures and identifying high-, medium- or low-risk areas, according to their vulnerability and the cost effectiveness of potential interventions."*
>
> (UNISDR, 2012)

As noted in the previous section, the UNISDR (2012) recommend that an assessment of the local risk context provides the foundation for implementing resilience strategies, and in effect, where resilience measures should be directed; to this end, they advocate a simple model for calculating risk[55], constructed from understandings

[55]Risk is defined as: *"The probability and potential impact of a hazardous event occurring, calculated from the potential exposure and likelihood."* (Coaffee et al., 2012, p.6)

of hazard[56], vulnerability[57], exposure[58] and potential resilience measures.; see Figure 4.8 (in this example disaster risk).

Figure 4.8 – Formula for Risk

$$\frac{\text{Hazard x Vulnerability x Exposure}}{\text{Resilience or coping capacities}} = \text{Disaster Risk}$$

(Source: UNISDR, 2012, p.7)

This is highly appropriate given that the built environment presents many inherent vulnerabilities, but logically also opportunities for mitigating wider hazards and their potential impact upon everyday life. However, a review of available risk assessment information undertaken for the DESURBS project (Coaffee et al., 2012), indicated that there was a lack of standard methodologies, compounded by a dichotomy between complex quantitative approaches and oversimplified qualitative methodologies.

At a National level, the UK Government produces both a National Risk Assessment, which is confidential and restricted to key stakeholders such as the police, and a National Risk Register, which is available to all. In effect, these documents identify potential threats and vulnerabilities for consideration at a more local level and are used by LRF's to draw up a 'Community Risk Register', which is intended to inform

[56]Hazard is defined as: *"A potential occurrence, which a given space is exposed to and could potentially be damaging to users or site operations."* (Coaffee et al., 2012, p.6)
[57] Vulnerability is defined as*: "The degree to which a development is particularly susceptible to a given hazard, as a result of site and design vulnerabilities."* (Coaffee et al., 2012, p.6)
[58] Exposure is defined as: *"People, property, systems, or other elements present in hazard zones that are thereby subject to potential losses."* (UNISDR, 2009)

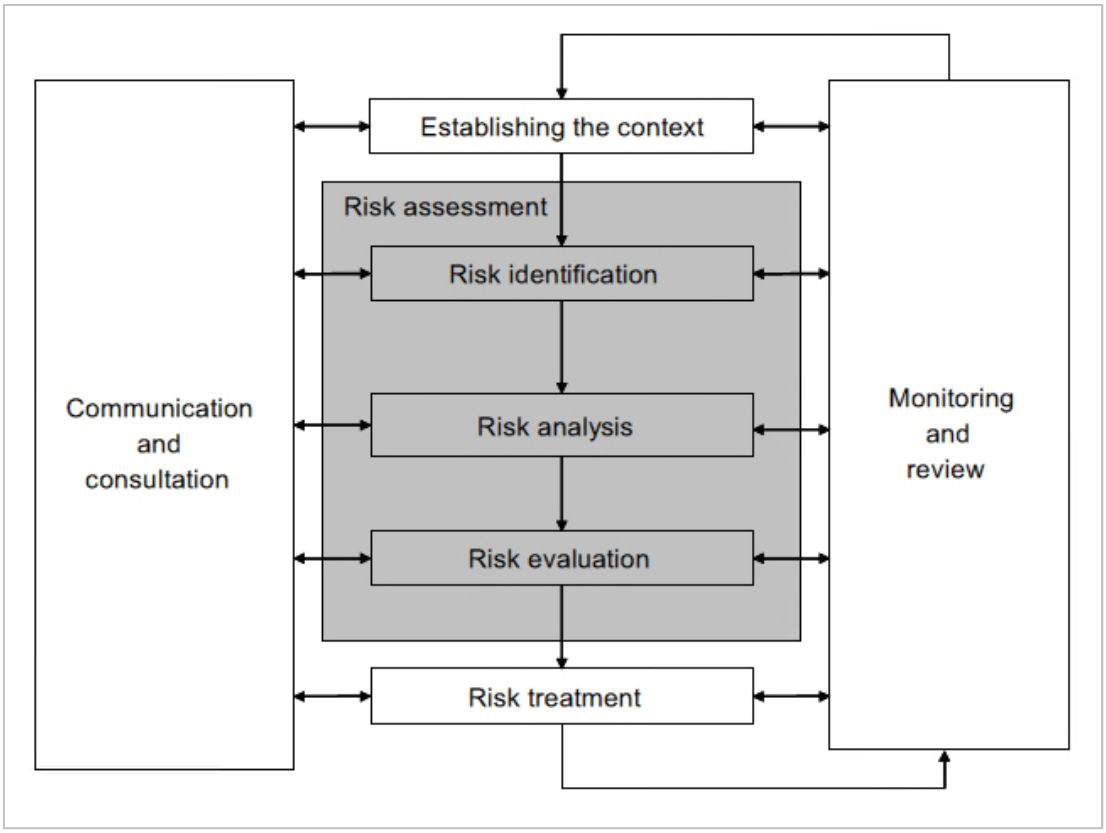
businesses and communities of potential threats and hazards. However, within the built environment sector, Bosher et al. (2008) suggest that there is inadequate consideration of these potential threats and hazards, with risk assessment only intermittently applied and with varying effectiveness[59]. Others have suggested that whilst understandings of risk are increasingly informing financial development practices, for architects and designers the priority remains smooth 'delivery', reputation and responding to the clients wishes (Imrie and Street, 2009; Jacobs, 2014). At a project scale, designers of the built environment are expected to carry out risk assessments under the 2007 UK Construction (Design and Management) Regulations (CDM) Act[60], these assessments are primarily aimed at construction related risks and there is no associated methodology.

More generic guidance does exist, notably from the British Standards Institution (BSI), which provides some simple principles for risk reduction; see Figure 4.10, below. However, this still seems quite esoteric and not particularly well tailored to the built environment, e.g. what is the difference between 'risk analysis' and 'risk evaluation'? Accordingly, Table 4.3 shows a simple stage by stage guide to risk management, adapted from Bosher (2014) and the BSI. It is proposed that together, these two concepts can form the basis of a simple, qualitative risk assessment and management framework for built environment stakeholders.

[59] There are many risk management tools developed specifically for counter-terrorism issues, but notablely they are nearly always undertaken by risk specific professionals, such as specially trained police officers. Whilst a variety of guidance is available to assist built environment stakeholders, such as RIBA (Royal Institute of British Architects) guidance on eliminating vulnerabilities, training events and NaCTSO also have an online self-assessment tool for end-users to establish potential vulnerability (VSAT), it is unclear how readily this is utilised.

[60] In April 2015, a new CDM act came into effect (CDM 2015), although responsibilities for designers are unchanged.

Figure 4.9 – British Standards Risk Management Model



(Source: British Standards Institution, 2009, p.12)

Table 4.3 – Risk Management Stages

STAGE	RISK MANAGEMENT STRATEGY
1	**Identify –** Establishing and classifying hazards/threats, before establishing the potential vulnerability, exposure and impact of a given hazard upon the space.
2	**Determine** – Establishing the magnitude of risk that a given space is exposed to, understood as a function of the likelihood and potential impact of the event occurring. Potentially utilising a risk matrix.
3	**Risk Reduction** – identify ways to reduce those risks and prioiritize resilience strategies.

(Source: adapted from Bosher, 2014)

It could be argued that the most significant issue for built environmental professionals, as identified within the National Risk Register, is flooding (Cabinet Office, 2015). There exists an extensive array of publications on this important topic, but many are summarized within the Environment Agency's (EA) *"Flooding in England: A National Assessment of Flood Risk"* (2009), which outlines the rationale for England's flood risk strategy and informs more local initiatives. Interestingly, the introduction begins by noting that whilst the EA has a *"central role in managing flood risk*", it is only one of many organisations with responsibility for doing so. Further, it repeatedly highlights the potential risk associated by housing development within the flood plain, although noting that this risk is an issue for local planning authorities to consider. More widely, the EA methodology utilises two main approaches: The Flood Map and The National Flood Risk Assessment.

The Flood Map shows the probability of flooding, calculated from topography and hydrology modelling in a given location, and illustrates the degree of vulnerability rather than the overall risk of flooding. In effect, users of the map must determine their own acceptable level of exposure, although it is not clear if this is widely understood. The importance of flood maps to development practices is enshrined by the NPPF through a 'sequential test', used to determine whether development is acceptable in a given location, according to its corresponding flood risk.

The National Flood Risk Assessment is a more comprehensive risk assessment for selected areas, which shapes internal EA risk reduction policy. In effect, the EA only acts where there is a wider public interest and any investment will bring a return of 1:5, on every pound invested in flood defences. Where this cost benefit is not possible, they utilise other risk reduction measures, but most commonly early warning systems and communicating the level of risk to individuals and communities. It is unclear how this work has been impacted by the recent cuts to the EA (Guardian, 2014a).

In effect the EA provides quantitative information, based primarily upon earlier incidents of flooding, that can be utilised by designers and built environment professionals using their own qualitative measures. Critically, the EA doesn't provide a working methodology on how to manage and reduce flood risk *per se*. This issue highlights a wider gap in built environment practice, about how risk reduction can be incorporated into everyday practice which will be explored further in Chapters 6 and 7.

Integrated Governance and Collaboration

> *"The experience of cities shows that in both low and high income contexts, it is the quality of governance that is the ultimate determinant of resilience."*
>
> (UNISDR, 2012, p.36)

Governance, according to Healey (2006), is the way we manage common affairs through formal decision-making institutions, complemented by informal networks. Within the context of this research, resilience is both an objective of governance practice, but also as a way that we can conceptualise how governance operates in an increasingly complex and disrupted world.

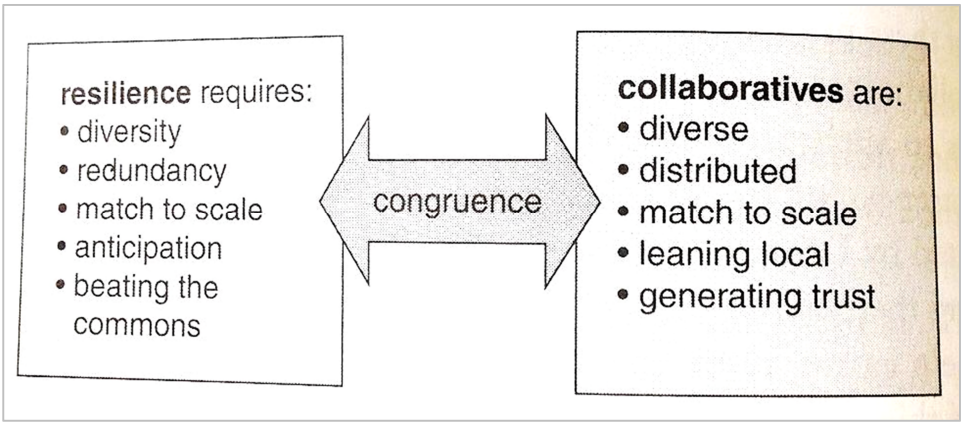
The literature review of urban governance and decision making in Chapter 3 established the critical importance of integrating urban design and urban resilience, bringing together a range of stakeholders, at a range of scales (Coaffee, 2013a). Moreover, the complexity of both the necessary stakeholders, and also the potential for disruptive hazard is a significant challenge to governance operation.

Accordingly, the theoretical basis of Healey's collaborative planning, further informed by an understanding of critiques of government reform and evaluation of recent practice, was used as the basis for exemplar principles for holistic governance, within Chapter 3. It was also concluded that this framework would allow the empowerment of local level stakeholders; critical to more successful governance, but as this chapter has uncovered, the enhanced resilience of cities (UNISDR, 2012; Edwards, 2009; Godschalk, 2003). A similar approach has recently been promoted by Bruce Evan Goldstein (2012) again based upon Healey's (2006) collaborative

planning, and which he terms *"collaborative resilience"*; noting how *"crises can be catalytic",* Goldstein (2012, p.359) suggests the concept can help to foster a *"blitz spirit",* common purpose, community action, new forms of knowledge and opportunities for learning, built upon a social-ecological model of resilience as a continual process.

Within this context, a number of other authors have recently championed collaboratives as a key tool for delivering resilience, although somewhat ironically there is currently little practice to draw upon. As resilience is increasingly understood as a process of initiating change (Walker and Salt, 2012), so Kaufman (2012) proposes a collaborative approach as a way to overcome institutional bias and 'group think'. Past studies, such as Coaffee and Healey (2003), which have looked at attempts to make local authority decision making more inclusive and holistic, have also noted the problem of 'institutional inertia'; which describes how the practices of large organisations are often difficult to change and locked-in to a particular way of doing things. Kaufman (2012) suggests that collaboratives require some understanding of potential consequences, further emphasising the role that risk assessment, foresight and preparedness play in the resilience process. More generally, Kaufman (2012) also identifies 'congruences' between approaches to resilience and collaboratives, see Figure 4.11, below; particularly around the need for a context specific approach, diversity of stakeholders and local focus.

Figure 4.10 – Congruences between Resilience and Collaboratives



(Source: Kaufman, 2012, p.90)

Earlier sections highlighted how resilience policy has sought greater local and community input; a more collaborative and local turn to urban resilience has the potential to deliver greater equity and local empowerment, plurality, social and environmental justice (Weichselgartner and Kelman, 2014). From the perspective of successful governance, Edwards (2010, p.19) elaborates on the significance of the local community to resilience:

> *"The community plays two central roles: it acts as a conduit of information and resources from the national and regional level both downwards and upwards by providing feedback and experiences from individuals and neighbourhoods."*

However, Chapter 3 highlighted that initiatives to engage communities could often demonstrate the limits of their power (Parkinson, 2004, 2009), whilst reviews of resilience policy demonstrated the dangers of 're-scaling' responsibility without power. Thus vertical integration is needed to give power and accountability, as well

as engendering collaboration, rather than 'passing the buck' by simply scaling responsibilities downwards. This issue highlights a further tension in the contested space of resilience theory and practice, surrounding the increasing localisation of resilience measures. Amongst resilience literature there is often a rather uncritical assumption that more localised practice is a desirable outcome (Edwards, 2009; UNISDR, 2012). However, for others this 'decentralisation of resilience practice' is part of a wider trend towards greater governance at a distance, which far from empowering local communities, is part of a wider trend of increasingly neo-liberal governance and retrenchment of the state (Jospeh, 2013; Coaffee and Fussey, 2015). Thus as power and associated responsibilities are moved away from the state towards a more dispersed range of institutions, professions, communities and individuals, we can be less certain that decisions are made in the broader public interest. Notwithstanding the criticism of contemporary resilience governance, Kaufman also (2012) notes that collaborative approaches take more time and there is increased cost associated with this; there is thus a conflict between collaboration and the *"austerity urbanism"* of the current time, and the contradictions between cuts, cohesion and local empowerment (Meegan et al., 2014). On this topic, the international organisation, Local Government for Sustainability (ICLEI), suggests that new governance approaches will require new financial models and arrangements (ICLEI, 2011), whilst Vale (2014) also warns that the short-term focus of contemporary politics will need to be overcome.

Others have argued that building collaborative resilience is literally a slow process, involving continual learning and reflection; comparing it to the "slow food" and

"slow cities" movements, which value long-term goals and processes (Carp, 2012). This understanding presents interesting parallels to the field of design; "*slow architecture*", devised by Eduardo Souto de Moura, promotes architecture that is created gradually and organically, as opposed to building quickly for the short term. Inspired by Brazilian architect, Lina Bo Bardi, there is growing recognition in architecture and design circles that increasing users role in shaping the places and spaces they will use, is critical to their success (Moore, 2012).[61]

Moreover, it is argued that the cornerstone of collaborative resilience is adaptive governance, based upon flexible, learning-based networks of people and organisations (Carp, 2012; Resilience Alliance, 2012).

These ideas about collaboration for resilience have interesting parallels to theoretical conceptions of social-ecological resilience; a concept that was first used by Adger et al. (2005) to explain how natural environments and human activities interact in coastal regions, but increasingly it is seen as a governance approach for complex systems.

> *"Social-ecological resilience is concurrently a scientific discipline, a governance approach and an increasingly important urban policy discourse."*
>
> (Wilkinson, 2011, p.7)

Wilkinson (2011, p.4) has attempted to use this understanding as a driver for more resilient urban planning, with an approach based upon inherent *"assumptions"*.

[61] An interesting example of this is the "ad-hoc urbanism" promoted by FAT architecture, which sees the development of the site as a series of temporal uses, shaped by stakeholders; in the example of Heerlijkheid Park, they held a "mud party" during the earthworks stage of development (FAT, 2014).

These are that: *"Social-ecological systems are linked",* and thus require integrated and holistic decision making and consideration; that *"Social-ecological systems are complex adaptive systems",* and therefore require ongoing analysis and learning, which inform the *"Building adaptive capacity.",* thus making accommodation for uncertainty, change and new forms of practice.

The critical issue of these new approaches to governance for resilience, utilising collaboration and integration, is change; as the Resilience Alliance (2013, p.7): articulate:

> *"Governing complex social-ecological systems requires an institutional ability and zeal to cope with, adapt to and shape sudden changes."*

The final pillar of resilient urbanism will explore the role of urban design and planning.

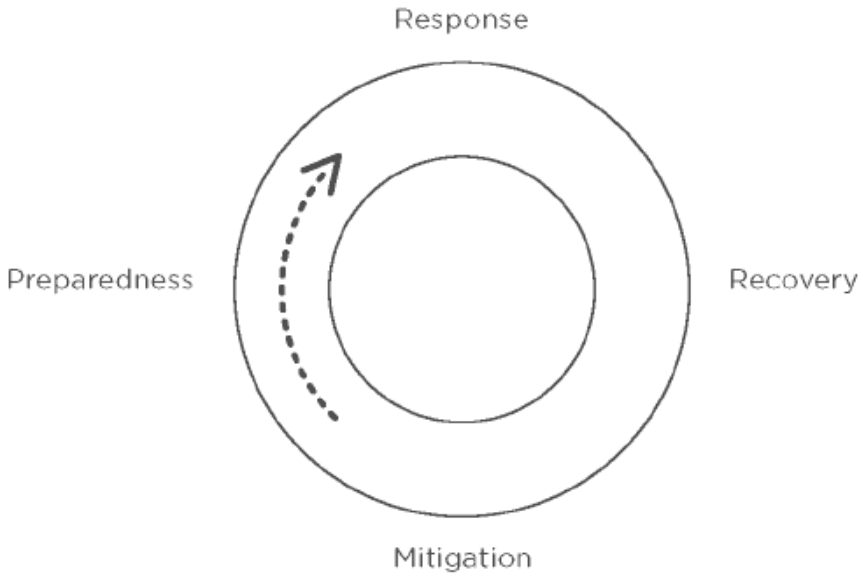
Holistic Urban Design

A key theme of this study is the importance of urban design and planning to enhance urban resilience (Davoudi, 2012; Tewdwr-Jones, 2013; Coaffee and Bosher, 2008). However, Chapter 2 outlined how urban planning has diverged from the implementation of urban form, with a dichotomy emerging between private sector design and public sector development. Further, Corner (2004, p.3) suggested that design is itself *"marginalized"* from contemporary urban design practice, as architecture has increasingly detached from the composition of the city and its social context.

Whilst the ‘paradigms’ of urban design have often swung between different ideologies and priorities, it is proposed that urban design represents a collaborative, transdisciplinary space for the integration of different perspectives and professions (Madanipour, 1996; Oc and Tiesdell, 1996; Cowan, 2003; Corner, 2004). Further, that it can also be understood as a ‘socio-spatial’ process which continually shapes places and their character (Carmona, 2014).

From this perspective, further parallels emerge between urban design practice and resilience theories, with their shared values of time, process and learning (Carmona, 2014; Corner, 2004; Waldheim, 2006); it could be further argued that design is itself the medium through which theory needs to be grounded. Inspired by disaster management approaches, Edwards (2010, p.19) has proposed that resilience should be considered as an ongoing cycle, made up of four contiguous stages: mitigation, preparedness, response and recovery; illustrated by Figure 4.12, below. Accordingly, holistic design and planning must consider all of these stages.

Figure 4.11 – The Resilience Cycle



(Source: Edwards, 2009, p.20)

Whilst resilience is not an entirely new consideration for the built environment, often expressed by the enhanced robustness of structures (Fisher, 2012; Hassler and Kohler, 2014), translating ideas developed from ecology and the natural world, can be challenging for more pragmatic practice (Anderies, 2014). However, one approach that tangibly interprets these ideas is 'land-use compatibility' (Colding, 2007); in simple terms it means considering the contextual suitability for a proposed use. White (2008, p.154) develops this idea from the perspective of flooding and urban water systems, in his ground-breaking paper, *"The Absorbent City":*

> *"A long-term view would be gradually to adapt the urban form and function within any city to be more sensitive to its geography and move towards a more sustainable pattern of development; not solely determined by socio-*

economic factors, but also its local geographical, climatic and environmental constraints."

(White, 2010, p.154)

As White notes, flooding is the critical urban risk, having become more commonplace and more costly; accordingly, Scott (2013, p.103) suggests that there has been a:

"…paradigm shift as it moves beyond a one-dimensional "keep floodwater out" approach, towards a more strategic, holistic and long-term approach characterised by mitigating both flood risk and adaptation, or increasing resilience to flooding events."

More widely, there is a strong consensus that green infrastructure (GI)[62] is key to addressing flood risk (Bosher et al., 2007a; Scott, 2013, White, 2013; Thorne, 2014); White (2010, p.157) explains how this multifunctional approach should work:

"…greenspace should be designed to operate as both temporary flood storage and as a safe flood pathway to transport water into areas with little or no consequences."

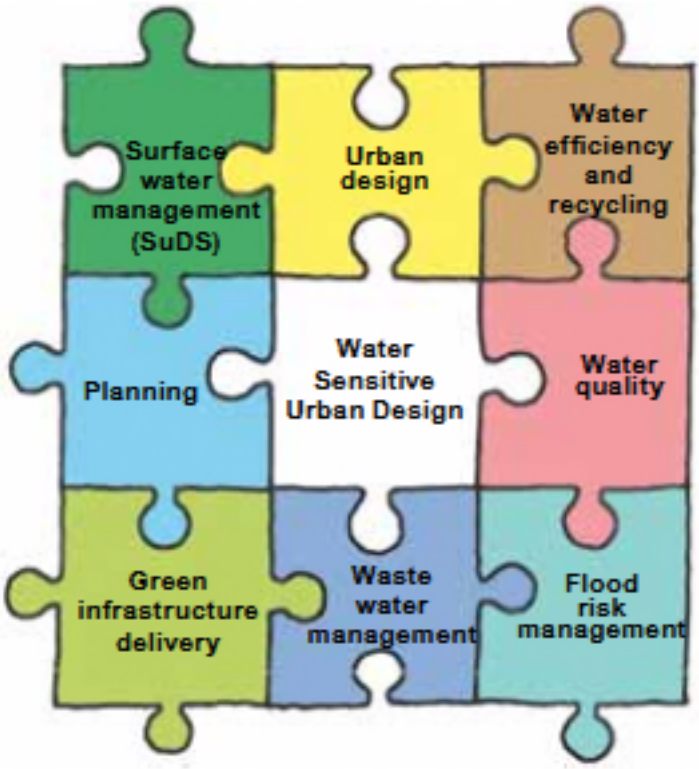
A key element of this GI approach is sustainable drainage systems (SuDs), which use natural features and infiltration to deal with rain and storm water, as opposed to

[62] *"GI is the network of natural and seminatural features, green spaces, rivers and lakes that intersperse and connect villages, towns and cities… When appropriately planned, designed and managed, the assets and functions have the potential to deliver a wide range of benefits – from providing sustainable transport links to mitigating and adapting the effects of climate change."* (Landscape Institute, 2009. p.3)

conventional piped systems which can lead to flooding (CIRIA, 2007, 2013; Thorne, 2014); SuDS was also a key requirement of the Pitt Review on flooding.

More recently, a more holistic approach to urban water management has been developed: Water Sensitive Urban Design (WSUD). In the UK, CIRIA (2013) have proposed that WSUD could be used to address and mitigate a variety of water related problems, including flooding, water shortages and the affordability of water, as well as a way to encourage cross-disciplinary working; as illustrated by Figure 4.13 below.

Figure 4.12 – Elements of Water Sensitive Urban Design



Source: CIRIA (2013)

The WSUD approach is perhaps the first tangible example of Coaffee's 4th wave of resilience policy, being increasingly local and technological; it involves designers and even individual householders, who can contribute towards greater resilience by how they manage their gardens (CIRIA, 2013), rather than the national agencies which have previously overseen these issues. The Australian city of Melbourne has been at the forefront of WSUD practice, with water management integrated into all urban practices and developments; including SUDs to minimise run-off, water collection to reduce the use of potable water and the minimising of wastewater created (Brown and Clarke, 2007); see Chapter 6 for further details.

However, it is the contention of this study that the key to enhancing resilience within the built environment emerges from Thomas Fisher (2012) and his seminal book on resilient design, *"Designing to avoid disaster: The nature of fracture critical design."* Fisher argues that the disasters that resilience initiatives seek to avoid or address, are caused *by "design errors"*; and thus, if we are to stop them happening again, we need to understand the causes and take remedial action. This simple understanding underpins the approach of this thesis.

Figure 4.13 – I-35W Bridge Collapse

(Source: Wikipedia, 2014[63])

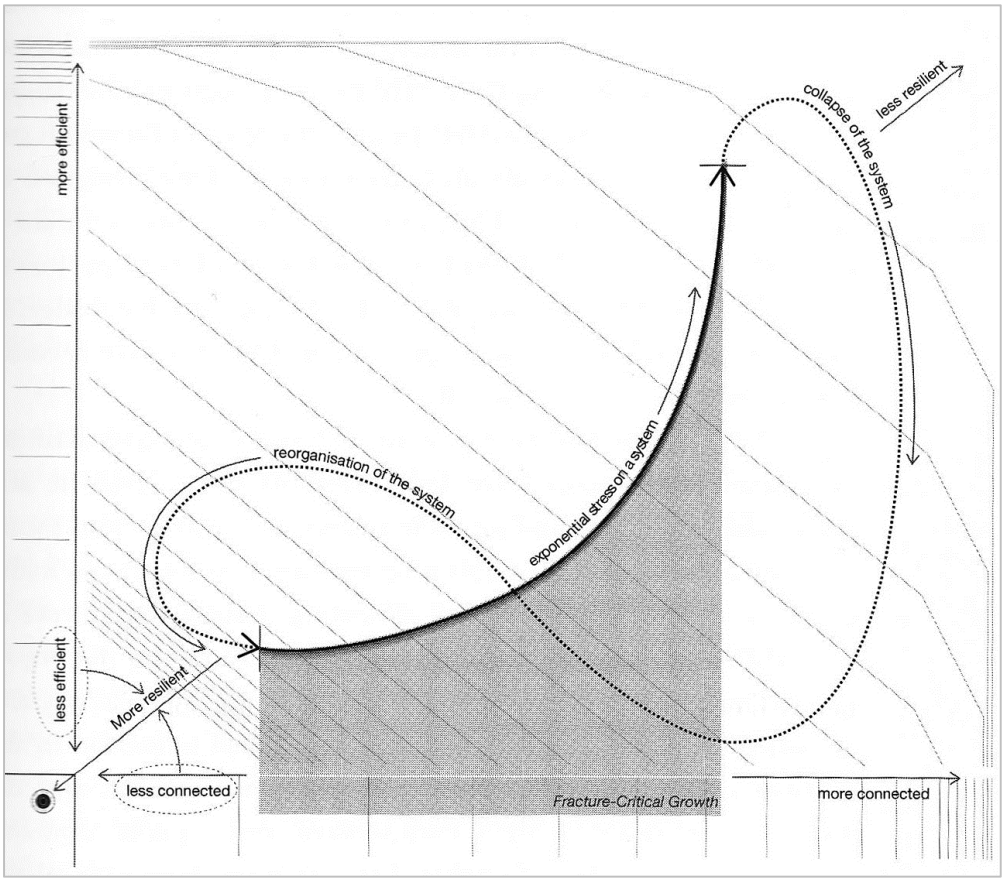
Fisher (2012, p.ii) suggests that the 2007 collapse of the I-35W, see Figure 4.14, illustrates a crucial design problem; which he refers to as *"fracture-critical design"* and describes accordingly:

[63] http://en.wikipedia.org/wiki/I-35W_Mississippi_River_bridge#/media/File:I35_Bridge_Collapse_4crop.jpg

"This is design in which structures have so little redundancy and so much interconnectedness and misguided efficiency that they fail completely if any one part does not perform as required."

Fisher (2012) further uses Holling's adaptive cycle d to demonstrate how increasing connectedness and efficiency can lead to a sudden collapse in built systems; illustrated by Figure 4.14 below.

Figure 4.14 – Cycle of Fracture-Critical Design



(Source: Fisher, 2012)

Others have noted that the design of complex infrastructure is never completely safe and that a move from ideas of fail-safe towards designs that are 'safe-to-fail', is

needed (Ahern, 2011); Fisher (2012) acknowledges that failure is often an inevitable part of the design and development process, but that it should also be used as a learning experience for a new era of *"public interest design"*, which shares the healthcare professions primary consideration for the public, rather than economic factors. In echoes of Tainter and Tailor (2014), Fisher advocates how designers *"problem-solving capacity"* and ability to assess a range of future scenarios through 'abductive' reasoning, and in effect producing new and innovative solutions, is key to a more resilient built environment. It could be argued that Fisher's approach is based upon current practices where resilience is insufficiently considered and applied, is thus too focussed on past events and is insufficiently forward looking; a problem that White (2013) identified in UK flood risk management.

Furthermore, Fisher's (2012) concept of fracture-critical design describes a development that is prone to catastrophic collapse, but how can we identify design that is simply poor, unsuitable or can contribute to wider vulnerability? The UN-HABITAT (2011, p.131, emphasis added) report on global settlement hints at potentially helpful understanding:

> *"There are also actions and investments actions and investments that increase rather than reduce risk and vulnerability to the impacts of climate change and these are termed maladaptation... Removing maladaptations and the factors that underpin them are often among the first tasks to be addressed before new adaptations."*

Within the context of climate change, maladaptation is generally understood to mean an act of adaption that makes the situation worse (Barnett and O'Neill, 2010).

However, in behavioural science, maladaptive behaviour is understood to mean *"inappropriate", "inflexible"* and *"counterproductive"*, and often occurs as a result of adapting to an earlier situation that is now no longer applicable (Supkoff, 2012).

Thus design that is no longer fit for purpose, has reached functional obsolescence (Fisher, 2012) and potentially increases wider vulnerability could be said to be maladaptive. Maladaptive design can occur when the context within which it sits, changes and there is a subsequent failure to adapt; further reinforcing the need to see the design and governance of the built environment as part of a continual process, rather than a one off action. The concept is also impacted by lock-in and path dependency and institutional inertia (Pike et al., 2010); whilst there are parallels to the governance concept of a 'rigidity trap', where there is an over-standardisation of regulation, and where adaptation is hampered by 'bureaucratic inflexibility' (Rogers, 2013). Table 4.3, adapts definitions of climate change maladaptation, to the context of the built environment in relation to understandings of resilience.

Table 4.4 – Definitions of Maladaptation

CLIMATE CHANGE (Barnett and O'Neill, 2010)	BUILT ENVIRONMENT (Authors Own)
Increasing emissions of greenhouse gases,	Increases vulnerability,
Disproportionately burdening the most vulnerable,	Transfers responsibility to vulnerable stakeholders,
High opportunity costs,	Disproportionate approach,
Reduce incentive to adapt,	Fails to adapt,
Path dependency.	Locked-in.

More widely, a broad consensus of theories and principles, which often blur the boundaries between design and planning, have emerged around how design can promote resilience; these include: 'multifunctionality' and 'co-benefits', where features address more than one concern in a joined-up way (Ahern, 2011, Zolli and Healey, 2013; White, 2010), underpinned by increased 'diversity', in particular emphasising the importance of capturing diverse knowledge from different stakeholders (Ahern, 2011; Wilkinson, 2011; Vale, 2014; White, 2010; Mehaffy and Salingaros, 2013; ; Anderies, 2014), and critically, 'adaptive capacity', and ability to adapt when needed (Ahern, 2011; Goldstein, 2012; Resilience Alliance, 2013; Mehaffy and Salingaros, 2013; Zolli and Healey, 2013). Significantly, the recent Intergovernmental Report on Climate Change (IPCC, 2014), used the concept of adaptive capacity to represent the ability to adapt to the impacts and changing

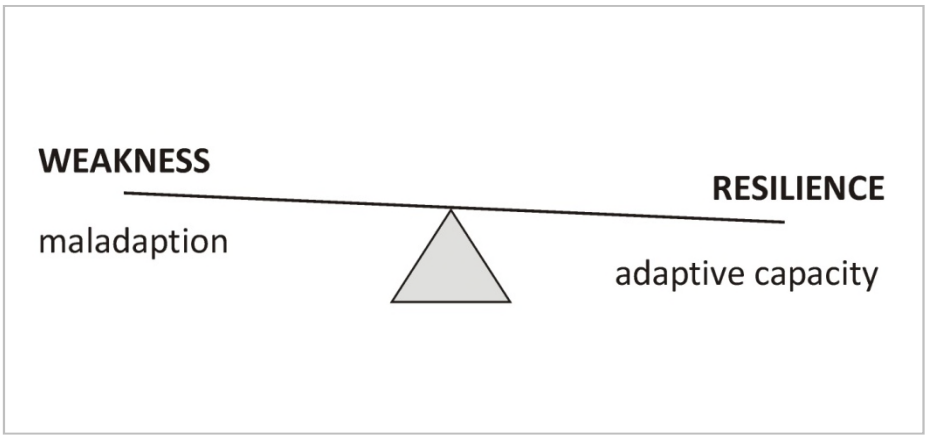
requirements of climate change. A more broad ranging definition is provided by Jones et al. (2010, p.2):

> *"… adaptive capacity denotes the ability of a system to adjust, modify or change its characteristics or actions to moderate potential damage, take advantage of opportunities or cope with the consequences of shock or stress."*

It is notable that this definition also identifies the opportunities inherent in seeking adaption, whilst there is increasing acknowledgement of how adaptive measures are more contextual, site specific and relevant at a local level (Galderisi & Ferrara, 2012). These understandings reinforce the importance of challenging maladaptive design at a range of scales, but also the potential benefits of promoting wider adaption and adaptive capacity building, within the urban planning and design professions more locally.

Ultimately, any resilience action will need to be proportionate and based upon risk management/mitigation principles, and thus resilience adaptation efforts must be balanced against the scale of maladaptation and potential vulnerability; see Figure 4.14, below. Thus, holistic urban design must promote the building of adaptive capacity, but also look to rectify past errors, including fracture-criticality, maladaptation and weakness in design, governance and ongoing management.

Figure 4.13 – Balance of Resilience and Maladaptation



(Source: Author)

4.5 CONCLUSIONS

The purpose of this concluding section of literature review is to pull together issues of design, governance and resilience, which together contribute towards resilient urbanism; the term urbanism being used to reflect the social, environmental and technical scope that are contained within the urban context, and which were identified within Chapters 2 and 3.

Resilience represents the environmental, social and technical science of persistence and adaption. Whilst there are many different understandings of resilience, recent years have seen increasing sophistication and increasing contextualism of approaches; particularly around the urban medium. Critical to this advancement is the engagement with 'complexity', which has moved our understanding of resilience beyond ecological theory and shock response to a governance approach that engages and proactively manages our dynamic world (Chandler, 2014; Zolli and Healey, 2013). Further, complexity has led to the development of 'resilience

thinking', which has attempted to ground the often theoretical and deductive models of resilience (Walker and Salt, 2012). However, there is still a need for more performative and practical approaches to resilience, urban policy and the built environment, based upon learning and induction to provide the critical context for this work (Brassett & Vaughan-Williams, 2015).

The urban resilience turn was increasingly about an engagement with risk, and the promotion of new ways of managing hazards, vulnerability and exposure (Coaffee, 2013b). Whilst these approaches have been increasingly proactive, it is proposed that risk management should be part of an ongoing cycle of mitigation, preparedness, response and recovery (Coaffee, 2013b; Edwards, 2009); mirroring the contiguous nature of urban design's 'place shaping continuum' (Carmona, 2014), which promotes long-term urban stewardship. Furthermore, it is contended that a new 'wave' of public resilience policy will focus on the local level.

Many of the findings of this chapter have focussed on the importance of the local; from the need for context in design, governance and resilience, to a wider policy trend towards greater stakeholder responsibility. It will be the location for new collaborations and where national policies are enacted, successfully or otherwise as well as the primary medium for learning about resilience practice. Similarly, the tensions around urban resilience and the rescaling of responsibilities, as well as concerns about the lack of design skills (Punter, 2009) will converge on this level. It is thus critical to study resilience implementation, and the institutions and decision makers that promote it, locally.

Whilst building resilience is not simply about the material process of design and development, how we can design our cities for greater resilience, is the key question of this research. It is contended that the built environment profession has shown a 'short-term memory' and a reluctance to look at the causes of earlier failures (Fisher, 2012), and therefore it is necessary to evaluate and learn from practice, including the causes of failures or disasters, as a means to find commonalities, inform new practice and pragmatically build resilience. But resilience is not just about looking backwards, it is also about understanding the changing nature of our world, and trying to look forwards and envisage what new forms of practice are required; it is contended that a design plays a key role in envisaging new approaches, abductively (Fisher, 2012).

Consequently, the potential for enhanced resilience will be examined through a series of empirical chapters considering multiple urban incidents, localised governance processes and stakeholder networks, and examining the specifics of individual developments which address aspects of urban design and flooding.

5.0 METHODOLOGY AND RESEARCH DESIGN

5.1 INTRODUCTION

Following the review of relevant literatures, it is the intention of this chapter to outline a clear and logical approach, which provides a clear, systematic and transparent method of empirical research. As a starting point, Yin (2014) argues that literature reviews can be used to develop overarching research objectives and potentially insightful questions, in addition to providing a grounded basis for research.

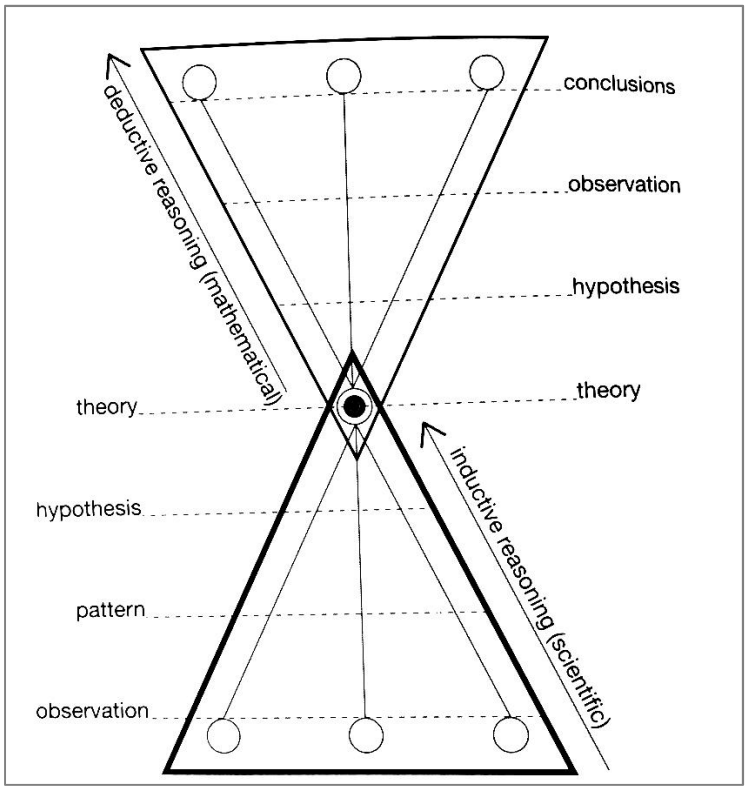
Accordingly, literature reviews critiqued the evolving theories and practices of 20th Century urban design, suggesting that it should be understood as an ongoing socio-spatial or socio-technical process, which provides an 'interface' between traditional professional silos and has the potential to bridge the gap between urban planning and implementation of individual developments. The study of urban governance outlined new governance arrangements and challenges, before presenting ideals for policy integration based upon holistic governance and collaborative planning. Significantly, the review of resilience provided not only a critical understanding of the underpinnings and development of the term, but also identified the gap that has emerged between its theoretical origins and the very limited application in practice.

From an epistemic perspective, these earlier conceptualisations of resilience, such as Holling's 'panarchy', have been informed by deductive reasoning. Bryman (1988, p.15) suggests that this basis *"seeks to extract specific propositions from general accounts of reality"*; alternatively it could be said that deductive approaches begin

with a theory or theoretical model and use observations to prove or verify it. Davoudi (2012) in particular, challenges the validity of these approaches for conceptualising the complex, social processes that lie at the heart of urban planning and development.

As such within the context of this research, a qualitative methodology is required, and which Bryman (1988, p.61) argues is founded on its *"express commitment to viewing events, action, norms, values, etc. from the perspective of the people being studied."* Similarly, an inductive approach is needed to explore and illuminate the social, technical and policy process that concern resilience, urban design and governance.

Figure 5.1 – The Inductive/Deductive Triangle



(Source: Fisher, 2012, p.176)

Fisher (2012) provides a helpful model to illustrate the differences between deductive and inductive approaches, showing how deductive reasoning uses observations to substantiate a theoretical conceptualisation of a system, whilst inductive reasoning uses observations and the identification of patterns, as the starting point to develop theories of how the system functions; see Figure 5.1, above.

The work conducted within the study presented here is based upon the inductive paradigm. Yin (2014) suggests that deductive approaches are a poor way of understanding the 'how' and 'why' questions, which necessitate the largely inductive case study format of this research, and which attempt to expand theory from an understanding of practical considerations. An inductive approach is much more appropriate to the complex context of resilience within the built environment, which cannot be easily conceptualised by a theoretical model (Wilkinson, 2011). Accordingly, the study will attempt to study processes in operation and in particular the policy tensions which have emerged around operationalising resilience (Coaffee, 2013a, 2013b).

Inductive reasoning is closely associated to certain ontological and epistemological positions around phenomenalism and empiricism (Bryman, 1988); accordingly this study has broadly adopted an epistemology approach of 'critical realism' (Bryman, 2012), which contends that appropriate methods of data collection can uncover both the scientific order of the natural world and the events and discourses of the social realm, which are both critical to the complex urban medium. This research is thus grounded in practice and has focussed upon the questioning, investigating and

collecting of information gained through case studies, and interpreting this data using understandings gleaned from literature reviews.

This study is also closely associated to two European Union Seventh Framework Programme's (FP7): DESURBS (Designing Safer Urban Spaces) and HARMONISE (A Holistic Approach to Resilience and SysteMatic ActiOns to Make Large Scale UrbaN Built Infrastructure Secure) projects, to which the author contributed. To ensure that this work was distinct, contributions were carefully constructed to produce bespoke, contained tasks, which utilise the author's specialist expertise in the practical application of urban design.

Within the context of the employed inductive approaches, the following sections will outline the wider processes of the research, an explanation of the methods employed, and justification for the particular methodologies utilised.

5.2 RESEARCH DESIGN

The understandings drawn from the literature review, together with reflections upon policy and practice, have helped to shape this study's overarching research objective:

> How can urban design and governance be used to secure cities against multiple risks and make them resilient to exogenous shocks?

The study adopted a qualitative, case study approach, and utilised inductive reasoning to interpret and understand practice. This section will explore the justification and benefits of this approach.

Given that the primary topic for this research is urban design, it is helpful to have some wider understanding of how design is implemented in practice, such that it can be successfully studied and analysed. There are many models of the design process from within architectural literature, such as Akin (1986) and Broadbent (1973), but these are often esoteric and overly complex. A more simple analytical conception is offered by Edelson (2002, p.108) who suggests that *"design is a sequence of decisions made to balance goals and constraints."* Appropriately, Schramm (1971, cited by Yin, 2014) suggests that:

> *"The essence of a case study, the central tendency amongst all types of case study, is that it tries to illuminate a* ***decision*** *or set of decisions: why they were taken, how they were implemented, and with what result."*

So whilst quantitative approaches, such as statistical analysis, have been used to measure organisational and institutional efficiency (for example Shan, 1990), it is increasingly clear that a qualitative, case study approach is the most appropriate method to study the complex set of evolving decision making and policy processes that surround resilience implementation in the built environment.

From a wider epistemological perspective, there is consensus amongst sources that the success of a case study approach is largely dependent upon its design, including the scope of research, the individuals and institutions involved, methods of data collection and the appropriateness of case studies selected (Strauss, 1987; Yin, 2014). Similarly, an understanding of methodological constraints is also critical.

Furthermore, when carried out correctly, case studies *"contribute uniquely to our knowledge of individual, organisational, social and political phenomena"* (Denscombe, 1998, 2010; Yin, 2014, p.2). Similarly, they can provide fine-grained understandings of a subject and its processes, taken from a variety of different perspectives, which can help to explain the big picture questions of 'how' and 'why' (Yin, 2014).

It was noted in Chapter 4 how understandings of resilience emerged from approaches that attempted to conceptualise complexity, particularly within social-ecological systems (Walker and Cooper, 2011). Similarly, Vale (2014) has suggested that resilience could be harnessed as an 'analytical tool' to understand how systems respond to disruption. As such, this study will use the lens of resilience to study the socio-spatial systems of urban design practice. Furthermore, Yin (2014, p.4) highlights the value that a case study approach would provide in illuminating these very issues:

> *"Whatever the field of interest, the distinctive need for case study research arises out of the desire to understand complex social phenomena."*

Yin (2014) also suggests that case studies need to establish their validity; in particular, he recommends using 'triangulation', possibly utilising documentary evidence and secondary sources, as a means to substantiate the validity of evidence. One way of doing this involves the formulation of a 'chain of evidence' (Yin, 2014), which involves comparing, contrasting and cross-checking different sources of data, such as comparing the transcripts of interviews with media accounts taken from local newspapers. However, research is also a pragmatic exercise and as Strauss

(1987, p.7) notes *"a standardization of methods (swallowed whole, taken seriously) would only constrain and even stifle social researchers' best efforts."* Accordingly, Yin (2014) also highlights the value of "exploring" and "theory development", with a focus upon relationships and process within the social and cultural settings.

When selecting case studies, the literature reviews highlighted how earlier studies of urban responses to risks and hazards have generally been macro in scale and post-disaster or pre-disaster in focus (such as Hinman and Hammond, 1996; Vale and Campanella, 2005). The conventional logic for determining selection, suggests that the study should either be 'typical' or 'extreme' (Yin, 2014), whilst Denscombe (1998, p.33) suggests that it should be informed by the presence of *"crucial elements that are especially significant"*, within the context of the study. Accordingly, this study will examine cases at a variety of scales from macro to micro, and both following serious hazard incidents in 'extreme' cases and within a more 'typical' every day context of a typical urban case study.

The study therefore adopted a two stage process; firstly an extensive, multiple-case study looking at significant urban incidents, utilising documentary evidence and meta data, to examine the causes and outcomes of these extreme events. This is followed by a single-case study with embedded units, based upon interviews with relevant stakeholders and secondary sources, examining issues from both a local governance and individual project level to highlight the more everyday nature of resilience at these scales.

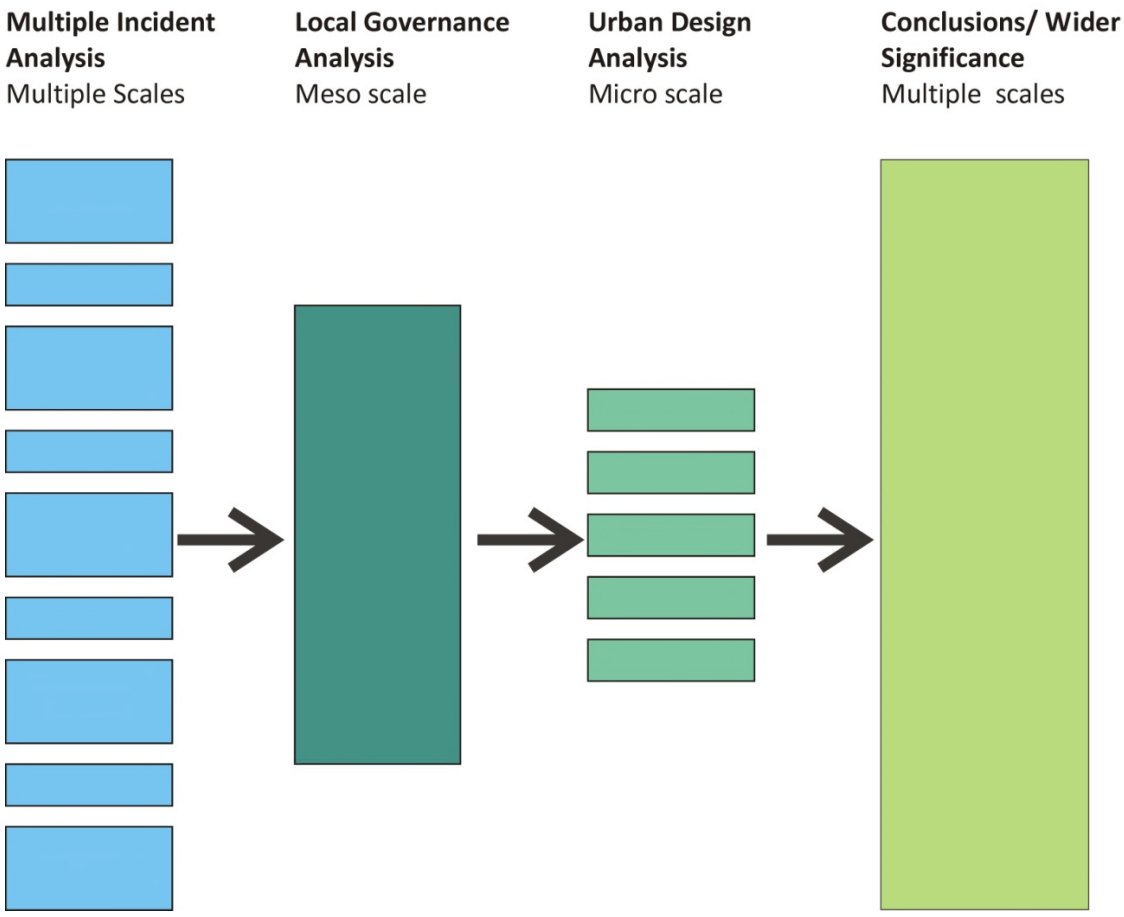
Pointedly, Fisher (2012) notes that in contrast to other mediums, design envisions the world as it "could be". Thus this research will also seek to be proactive;

considering anticipated consequences and foreseeing likely outcomes, in addition to looking at the results of past decisions. As such, the multiple-case study will attempt to identify design errors, as recommended by Fisher (2012), as well as providing a more detailed analysis of causes of these events. This wider examination of resilience, will uncover findings that are directly relevant to the analysis of more everyday problems at a city and individual project level.

Accordingly, the second case study will use the single-case study to examine issues of governance and urban design, through a qualitative study of built environment and resilience stakeholders and an examination of individual development projects.

Together these two case studies will explore issues of resilience and urban design at a number of levels; from wide global concerns, to the priorities and policies of a city-region, before finally examining the implementation of resilience approaches on an individual project basis. This approach of considering issues at an extensive to intensive basis, as illustrated in Figure 5.2, will conclude with a reflection on the studies' wider relevance, given recent national and international events.

Figure 5.2 – Scales of Study Analysis



(Source: Author)

The following sections will outline in detail the research processes that have been followed.

5.3 MULTIPLE CASE INCIDENT ANALYSIS

> *"Every design amounts to what is essentially a "what if" experiment, based on what we know about the needs of particular people and environments and the conditions of a particular place and time. We have generally not seen design in that way. Instead, most of us view design as a subjective activity, a matter of personal taste in what we buy, use and occupy... In science, almost*

> *all experiments happen in controlled laboratory settings, so that if an experiment fails – as they often do – no one gets hurt and we can learn from the failure in order to conduct a more successful experiment next time. In design, though, we have few laboratories. Design experiments, in contrast, often happen at full scale and in real time, with the potential for great harm and tremendous cost should they fail – as they sometimes do."*
>
> Fisher (2012, p.170-172)

This quote from Fisher expands upon his observations documented in Chapter 4 about the need to evaluate and learn from earlier design failures as a means to promote greater resilience, but also the cultural shift in development norms needed to consider the design process in this way. This approach echoes Hall's work on "Great Planning Disasters" (1980) which studied the "pathology of planning" and attempted to examine past planning failures, as a means to make better informed decisions in the future. Accordingly, the study will look to examine weaknesses in past and present practice of urban design, as a way to inform new approaches that build resilience. As Edelson argued (2002, p.105), *"design offers opportunities to learn unique lessons"* and that *"design research yields practical lessons that can be directly applied."* However, he also notes how the study and analysis of design presents unique challenges for research:

> *"The process of design is complex. Its open-endedness and reliance on creativity have made it a challenge for researchers to chatracterize and explain."*
>
> (Edelson, 2002, p.108)

Accordingly, this first part to the study looked to consider a wide number of urban incidents, including man-made threats and 'natural' disasters, as a means to identify some important notes for wider resilience practice (Fisher, 2012). Yin (2014) identifies six major sources of case study evidence, as well as their relative strengths and weaknesses; of these, this part of the study will utilise documentation and archival records. Documentary evidence often provides very precise evidence, such as exact names of stakeholders involved and a timeline of what has occurred, which can be very specific to the case study and sufficiently broad to allow a wider understanding of the events. However, it is also necessary to have an awareness of the relative biases; with information often presented from a particular perspective, and that access to information may also be a problem, with certain sources of evidence being withheld (Yin, 2014).

Whilst this sort of information is often used to supplement or corroborate interview based methods, by conducting the research in this manner, it was possible to cover an extensive number of cases, quickly and with little cost. This evidence was then collated within a comprehensive case study database (Yin, 2014).

The study reviewed over 200 incidents for case studies, which were synthesized from initial information supplied by the DESURBS projects eight international partners, and drawing on their expertise in the fields of engineering, design and planning, to illuminate the 'weak points' in the space, the role of key stakeholders and the role of risk assessment and management. These were supplemented with additions by the study author to reflect some emerging events, such as the Tohoku earthquake in Japan in 2011 and the effects of Hurricane Sandy on New York in 2012.

The criteria against which incidents were selected were as follows:

- A range of 6 incident types:
  - Terrorist Events,
  - Urban Accidents,
  - Crowd Events,
  - Tunnelling and Ground Movement,
  - Earthquake,
  - Floods and Storms.

Developing the database of incidents necessitated a forensic examination of the incidents using multiple, secondary sources to understand the context of the failures, with special analysis of the following issues:

- Incident type, location and description: The primary focus was on crowded places initially prioritising events which had occurred in shopping centres, transport terminals and sports stadia although other urban spaces were included. Fields included details of what happened, the frequency of its occurrence, how it happened and where, in order to identify:
  - Preparedness: level of exposure, adaptiveness, sensitivity of the urban space in which the incident occurred;
  - Response: how did relevant authorities respond and how quickly;
  - Recovery: speed of adjustment, restoration of equilibrium
- Planning and design elements of the site: to understand the history of the planning of the site, its present planning context and the design and construction of the structures within it.

- Adaptation responses: An outline of any steps taken by both statutory authorities (including government) and voluntary responses of others (e.g. building owners, private businesses etc.) to prevent this type of incident occurring and reoccurring. A note was made of legislation, standards, governance strategies/arrangements and physical measures (e.g. design modifications to buildings, road closures etc.) employed to this effect.

- Strengths and weaknesses of the space: All of the incidents highlight problem areas and strengths in the space in which they took place. This includes elements such as the design of the space, its built fabric and materials, its management and governance, as well as the response to the incident and any issues which arise from this and its aftermath.

- Incident Impact: An assessment of the impact of the incident broken down by economic (both monetary and non-monetary measures), social (casualties, fatalities, numbers left homeless and/or displaced), physical and material (including any measure of environmental and ecological disturbance/degradation) and infrastructure and utility disruption factors.

- Emergency planning context: any relevant emergency planning policies pertaining to the country in which the incident took place, the agencies and actors who are engaged in the emergency planning, and the relative role played by built environment professionals in the development and implementation of emergency planning for the location.

- Stakeholder involvement: resilient urbanism will require a context specific appreciation of the role and capabilities of a range of stakeholders that should be involved in the design, construction, management and maintenance of urban spaces.

- Role of risk assessment techniques: An assessment of what risk management techniques have been utilised and their significance.

Following the initial collection of information and its collation within the incident databases, the cases were further analysed to understand the failures in the design process. With a few notable exceptions, such as Hinmon and Hammond's (1987) book on the Oklahoma bombing, it was difficult to find formal sources of information about the incidents, such as academic books or papers.

More often the analysis process involved piecing together different secondary sources to form a coherent 'story', and using triangulation to establish their veracity. It also proved important to look for details that were not included, such as the absence of mitigation measures. Similarly, details regarding adaption or post-event reconstruction proved to be particularly helpful, often suggesting where failures or weaknesses had earlier occurred. Where the story of the events was insufficiently robust, or left too many questions unanswered, the incident was omitted from the database. From over 200 original incidents, the incident database was refined to 94 detailed cases, spread across the 6 hazard types.

Incidents were further analysed to understand how their planning and design was initially carried out (e.g. what types of assumptions were made, what models were

used and which stakeholders were engaged in their fruition) and increasingly uncovered how weaknesses in this design and planning contributed to its occurrence and its impacts. In doing so, this analysis began to identify where and how possible strengthening alternatives might have worked to mitigate or prevent a given risk, and in particular the roles of planning, design and engineering and construction, as well as the role of governance, management, preparedness and the cultural characteristics of the local population.

As more information was pieced together within the case study database, patterns began to emerge, and in line with Fisher's model of inductive reasoning, it was possible to identify some general trends about the causes of these failures; including the broad areas of responsibility and some more detailed weaknesses in the design process. Furthermore, these 'design weaknesses' also provided lessons about how to avoid or reduce the impact of similar incidents in the future, and were thus collated into a number of example cases which illustrated the specific failure, and in line with Fisher's (2012) recommendation, provided important lessons for designers and built environment professionals. Some early findings from this research were presented to professional stakeholders using a short talk/lecture format, and their feedback was critical in establishing the usefulness and appropriateness of the design weaknesses and the concept of maladaptation (see Chapter 4).

More generally, it seemed telling that information about risk assessments or risk management decisions was particularly hard to find, perhaps indicating a reluctance to make this sort of information public or a wider failure to address risk, as Fisher (2012) and Bosher (2014) suggest. Similarly, it was apparent that the degrees of

transparency and openness varied between types of incident; for example (and perhaps surprisingly), many of the terrorism incidents yielded good sources of information, which made it easy to understand the causes and contributing factors, whereas conversely with cases of flooding, it was often more difficult to determine the causes, although there was frequent acknowledgement that it was linked to a complex range of land practices, involving both government and private sector actors. Many of the urban accidents, which were used as something of a catch-all, typically involved privately operated facilities, where it was often unclear what post-incident or adaptive measures were put in place.

This also appeared to be true of different nations; it was much easier to research incidents where partners had provided some basic information, and there was a natural skew towards incidents in English-speaking countries where the information was easier to identify. As an example, several Italian incidents were put forward by partners, but in all cases it was difficult to establish some basic facts, most notably for the 2011 Genoa flooding. Despite leading to the death of six people, there was no public information released about the causes or how it might be prevented in the future, which seemed to indicate more than simply a language issue. By contrast, for many UK incidents, information was much easier to ascertain, although details of risk management processes were still limited.

During this process of analysing earlier incidents, a number of cases were identified which were neither incidents nor near misses, rather they highlighted the scope of preventative action for mitigating against risks before they could occur, or to prevent similar events from occurring again in the future. Although fewer preventative

examples were identified than had been expected, each case had a number of lessons for the design of other urban spaces. These cases were further developed using the format of example cases, but critically were presented to show best practice in relation to the critical hierarchy of risk management, as presented by Bosher (2014). Using these sequential risk management stages, a number of good and bad cases were explored to demonstrate lessons for built environment stakeholders and the value of managing risk proportionately.[64]

This work, and particularly the identification of design weaknesses, would inform the analysis of the embedded case study within Chapter 8.

5.4. SELECTING THE CASE STUDY

Having analysed a wide range of international cases that demonstrated aspects of resilience or a comparative lack thereof, the study then considered an everyday example in more exhaustive detail. Thus a single area, exploratory case study with embedded units was used to examine how issues of resilience are promoted through local governance and decision making processes, considered against an idealised proposition of holistic governance, as identified within Chapter 3. The chosen case study was the city-region of Nottingham. The city-region scale of the case study, which includes a number of local authorities and a variety of government and non-governmental actors with responsibility for the area, seems particularly appropriate given the recent focus on this scalar level within UK policy making[65]. Within this wider study, a second part focused on embedded units, in this case 'vignette'

[64] This was contributed as a discrete task for the DESURBS project.

[65] City-city regions with additional devolved powers, have been a major feature of recent urban policy, with the Greater Manchester Statutory City Region acting as a pathfinder for this new scale (BBC, 2014a).

development projects (Barter and Reynold, 1999), both as a source to explore wider decision-making issues and as an appropriate scale to address issues of urban design.

In both instances the primary source of data was interviews with local built environment and resilience stakeholders, utilising a semi-structured format which allowed interviewees to outline their motivations, priorities and engagement, as well as to interpret and reflect upon the successes of relevant policy narratives. This activity yielded what Kvale (1995, p.5) terms, *"descriptions of the life world of the interviewee with respect to interpreting the meaning of the described phenomena."* This semi-structured format had a number of advantages over other forms of data collection; critically, the literature review revealed the absence of documentary evidence on the implementation of resilience, meaning that interviews with stakeholders would be the most straight forward way of gathering original empirical data. Within this context and in comparison to more structured interview techniques, this approach provides flexibility in the event that the researcher is not aware of all the information that the interviewee could potentially be questioned about (King, 1987). Finally, interview transcripts would provide an invaluable source of opinion and critique on the effectiveness of current UK resilience policies and more localist planning and design approaches.

Figure 5.3 – Nottingham Location

(Source: Ordnance Survey, 2014[66])

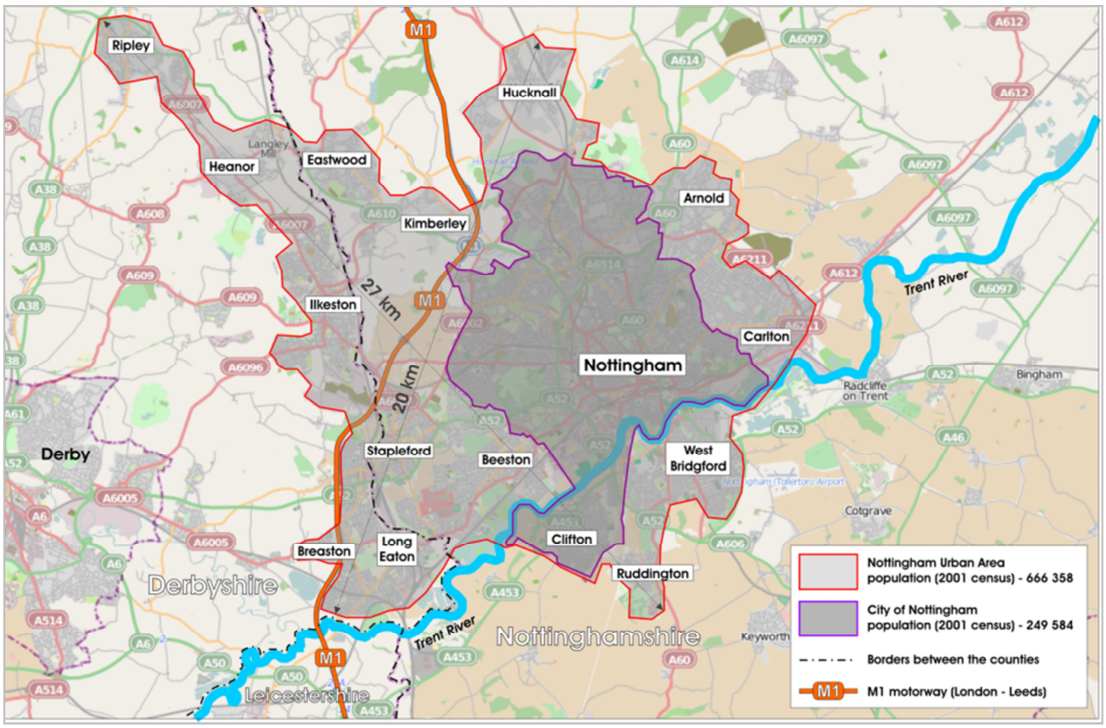
The case study focuses on the city-region of Nottingham, which includes both the city and surrounding district authorities. Nottingham is a significant city located within the East Midlands (see Figure 5.3 above) and one of the UK's 10 'Core Cities', denoting that it is one of the largest economic areas of England, Scotland or Wales, outside of London. Nottingham has two major universities, a variety of cultural facilities including theatres, art galleries and live music venues, and is a significant tourist destination, primarily because of its association with Robin Hood.

[66] https://www.ordnancesurvey.co.uk/osmaps/

Whilst much of the city is fairly low-lying, sitting upon a shallow, sandstone bedrock within the floodplain of the River Trent, the city's topography rises up sharply to the Sherwood ridge in the north, and is characterised by sharply sloping residential areas. In addition to the Trent, which runs from west to east and marks the city's administrative boundary to the south, it is bisected north to south by the River Leen and east to west by its tributary the Day Brook, before finally merging with the Trent in an outfall by the Meadows. Finally, a network of canals, which were built during the areas industrial peak, crisscross both the city and county.

The 2011 Census showed that Nottingham had a growing population of 305,680. However according to the Office of National Statistics (ONS), the Nottingham Urban Area which includes both the city and the adjoining urban areas, has a population of 729,997; see Figure 5.4, below for illustration of the Nottingham Urban Area.

Figure 5.4 – Nottingham Urban Area



(Source: Wikipedia, 2014[67])

This urban area is a complex patchwork of different local government administrations; in addition to Nottingham City Council, portions of this area are also controlled by Rushcliffe Borough Council, Gedling Borough Council, Ashfield District Council, Broxtowe Borough Council, Erewash Borough Council and Amber Valley Borough Council. Moreover, whilst the City Council is a unitary authority, meaning that it is responsible for all local government functions within its area, the surrounding authorities are part of a two-tier system, where Borough and District Councils have responsibility for housing and local planning and there is an upper-tier authority responsible for transport, strategic planning and waste management (including water and surface water). For Rushcliffe, Gedling, Ashfield and Broxtowe,

[67] http://en.wikipedia.org/wiki/Nottingham_Urban_Area#/media/File:GreaterNottingham-map.png

the upper-tier authority is Nottinghamshire County Council, whilst for Erewash and Amber Valley it is Derbyshire County Council.

Of these authorities, the urban areas to the north and east are much more loosely connected, and thus the study has not focussed too closely upon them, rather concentrating on the city and areas to the south of the city; see Figure 5.5, below.

Figure 5.5 – Nottingham Authority Boundaries

(Source: Wikipedia, 2010[68])

Whilst Nottingham City has a close association with Gedling and Broxtowe, including shared services and a Local Development Framework (LDF) for planning, there are tensions with Rushcliffe Borough to the south that are exacerbated by different political administrations. Much of Rushcliffe is located within the contiguous settlement of Nottingham and is notable for being named by Halifax Building Society

[68] http://en.wikipedia.org/wiki/Districts_of_England#/media/File:England_Administrative_2010.png

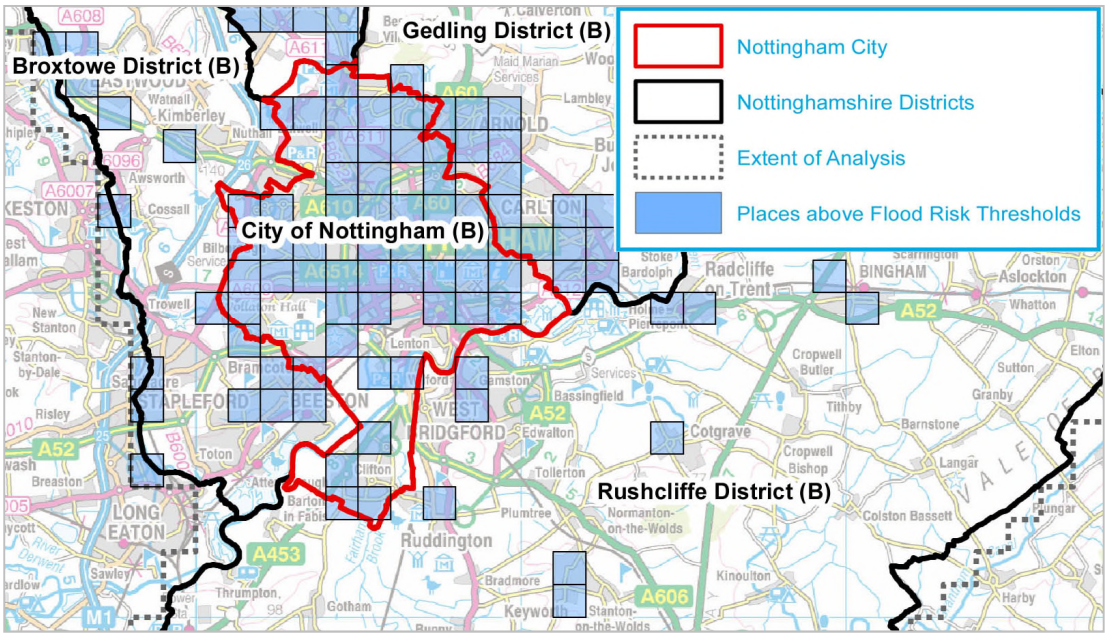
as one of the UK's top 20 places to live (Nottingham Post, 2011). By contrast the city faces many social challenges; in the 2011 Census, Nottingham was found to contain the largest proportion of workless households in the UK (Guardian, 2014b).

Both Nottingham and Nottinghamshire have a long history of flooding, with notable floods occurring 1998, 2000 and in particular the summer of 2007. Appropriately, the Nottingham and Nottinghamshire Community Risk Register (Nottingham and Nottinghamshire Local Resilience Forum, 2014, p.14) identifies flooding as the area's second most serious risk after pandemic influenza, stating:

> *"It is a sad fact that flooding is a recurring theme in Nottinghamshire with many of our communities susceptible to flooding… Even though we have good arrangements in place, because flooding happens so regularly, we still rate the risk from flooding as 'High'."*

In response to these events and the ongoing risk of flooding, the Environment Agency published the Fluvial Trent Strategy (EA, 2005) which looked at flood risk across the whole of the Trent catchment, and highlighted the fairly low standard of flood protection within the area. Figure 5.6 illustrates the areas where there is significant flood risk. Accordingly, the study provided a variety of recommendations, including the replacement of the areas aging and ineffective flood defences, most notably along the Trent's vulnerable left bank.

Figure 5.6 – Areas with flood risk above threshold



(source: JBA Consulting, 2011)

Finally, in addition to fluvial flooding, several of the areas overlapping flood studies highlight the problem of surface water flooding, on which the Greater Nottingham Scoping Water Cycle Study (Scott Wilson, 2009, p.39) notes:

> *"Surface water flooding is a serious issue in built up areas within Greater Nottingham due to the extensive coverage of impermeable area."*

More specifically, *"the Day Brook and River Leen Strategic Flood Risk Assessments"* (2008, p.44-35) highlights the vulnerability of these systems to this form of flooding:

> *"The flooding experienced from the River Leen and Day Brook can be attributed to a legacy of unattenuated surface water run-off generated by historic urban development within the areas of Nottingham City Council that*

drain both by natural topography and via the sewer network to the River Leen and Day Brook."

5.5 EMBEDDED CASE STUDY APPROACH

Given the embedded nature of the case study, it has been important to take an iterative approach; in practice this meant learning from information as it is gathered and using it to inform ongoing interviews and data gathering. It was originally intended to follow a 'Delphi' method, which is an iterative survey method using multiple 'rounds' of research and analysis, used to establish convergence of opinion (Wassermann, et al., 2011; Woudenberg, 1991). Further, Landetta et al. (2011, p.1630) suggest that it is a particularly appropriate method to *"obtain a reliable group opinion from a set of experts"* and that it can *"provide valuable aid for solving a complex problem."*

In practice this approach began with an online survey, which attempted to establish which local stakeholders were and should be engaged with the process of building resilience within an urban development context, but also the critical issue raised by Coaffee and Bosher (2009) of their temporal involvement in this process. The survey was promoted using social media, through a local professional e-newsletter, emailed to the author's professional contacts in the area, as well as the participants in Fisher's (2012a) earlier study of resilience institutions within the study area[69]. Whilst the initial survey of stakeholder involvement did provide some useful data, the response was much poorer than had been expected, with just 11 completed or partially completed responses in total during the month it was online. Furthermore,

[69] This work was conducted as part of the DESURBS project.

it had been anticipated that a survey would yield a large number of potential participants who could be selected for interview according to their suitability for the study.

However, as the study proceeded it became apparent that the Delphi method was inappropriate, and could lead to a false consensus. A Delphi approach aims to use analysis of earlier 'rounds' to narrow the focus of questioning, and as a way to find consensus. However, this conflicted with the semi-structured format of interviews, which aimed to stimulate participants to explore directions that had not been considered by the author, which would be critical given the lack of documentary evidence on the subject of resilience in practice. Furthermore, it also became apparent that there was no single consensus on the subject, rather a number of nuanced perspectives, and thus an attempt to force consensus was counterproductive.

In practice, the survey did help to establish conversations about the involvement of stakeholders and served as a pilot study for engaging participants. Similarly, a second case study in the West Midlands was investigated, and a number of pilot interviews undertaken prior to the start of the main case study. These initial interviews highlighted the difficulty in establishing participants - particularly within local authority planning departments where would-be-participants were concerned about the potential 'scrutiny' of the project - and that without sufficient engagement from key stakeholders, the study would not be viable. Similarly, with the complexity of the local context for resilience and development, which involves many different actors, stakeholders and associated policies, who would all need to be considered if

the project objectives were to be achieved; it thus became clear that a single case-study, with embedded units, would be the most appropriate way for the study to proceed, and to encapsulate the necessary information within the given time frame.

These experiences informed the case study's sampling methods and means of attaining participants within the fields of the built environment and associated local resilience stakeholders. It had been intended from the onset that the participants would be drawn from the author's professional contacts within the area, supplemented by 'snowball' sampling, a method which Burgess (1990, p.55) describes:

> *"This approach uses a small group of informants who are asked to put the researcher in touch with their friends who are subsequently interviewed, then asking them about their friends and interviewing them until a chain of informants has been selected."*

Interviewees were asked to provide introductions to potential respondents through informal contacts, which added credibility to the research for those contacted. A number of sources also suggested that this approach could be used to identify and utilise 'gatekeepers'; individuals with particular influence in gaining co-operation from other stakeholders and further legitimising the work (Pridham, 1987; Yin, 2014). Gorden (1980) further suggested that it was important to use this process to find 'special respondents' who had unique insights into local processes, which result from their access to critical information. Snowballing was particularly successful amongst emergency services stakeholders, whilst a commercial property agent proved to be a 'gatekeeper' to a number of other key participants. Similarly, it was

necessary to speak to several stakeholders working at the Environment Agency, before finding those whose input would be most pertinent to the study.

A review of the local policy framework was not only critical for formulating themes and questions for interviews, but it also indicated which stakeholders were important to local governance arrangements and therefore should be encapsulated within the study. Thus, it was possible to use the snowball and network approaches to purposively target important stakeholders that had not been reached; this was supplemented by attending local built environment and resilience events, as well as utilising academic contacts for introductions. This was an important adjustment to the sampling method, as some stakeholders proved to be difficult or reluctant to engage; most notably local authority planners and local health officers responsible for resilience. Denscombe (1998, p.216) outlines how these interviews with participants were effectively bounded:

> *"The process of research will involve the continued selection of units until the research arrives at the point of 'theoretical saturation'. It is only when data seem to confirm the analysis rather than add anything new that the sampling ceases and the sample size is 'enough'."*

A total of 34 participants were interviewed, with a further seven follow-up interviews carried out to provide greater detail about the design and the specific development process of a 'vignette'. These interviews took place between the summer of 2013 and the early months of 2014[70], and were conducted in a location chosen by the participant. Typically this meant a quiet office within their working

[70] A small number of the interviews were carried out with a colleague from Loughborough University, as part of the DESURBS project.

environment, although two initial interviews were conducted over the phone, and three follow-up interviews were also carried out in this manner.

Interviews were scheduled to last no more than an hour, although a small number overran where participants had a lot to say on the subject. The interviews were documented by a digital recorder, which was highlighted to participants by a study consent form outlining their right to confidentiality and to withdraw their participation from the study at any time, if they so wished.

The study followed Yin's (2014, p.73) principles for conducting successful interviews:

- *Ask good questions,*
- *Be a good "listener"*
- *Stay adaptive,*
- *Have a firm grasp of the issues being studied,*
- *Avoid biases,*
- *Conduct research ethically.*

As mentioned previously, an understanding of the local policy context would prove critical to formulating appropriate questions for participants, as well as enabling the researcher to more thoroughly interrogate interviewee's responses on these subjects. Accordingly, rather than using a series of set questions, a topic guide provided a broad framework for discussion; the topics were:

- INTRODUCTION – Ask the participant about their work and professional background, as well as their role in local governance arrangements (if any);

for example: Could you introduce yourself and your role within your organisation?

- RESILIENCE - Examine participants understanding of resilience, and their engagement and experience of implementing it, in particular with 'vignette' projects; for example: Do you think resilience is part of your practice?

- RISK – Assess participants understanding of risk, including what they believe is the most significant risk to the case study area, further explored through their risk management approach; for example: What are the main barriers to risk reduction?

- STAKEHOLDER ENGAGEMENT – Determine which stakeholders the participants engage with, at what time, and the relative successes and failures of these relationships; for example: (on their engagement with another stakeholder) did you find that you spoke a common language?

- CURRENT PRACTICE – Understand participant's priorities and success criteria, as well as sources of guidance and how 'vignette' projects had progressed; for example: Do you use urban design guidance?

Often more illuminating than these initial questions, were the follow-up enquires that sought to 'read between the lines' with interviewees responses and establish what they may be 'inferring' (Yin, 2014). Moreover, the questions posed to

participants would prove to be both iterative and adaptive, for example as the researcher learned more about local governance processes, so he was able to further interrogate the stakeholders experience of these relationships.

It was particularly notable however, that many participants were uncomfortable exploring topics in a rhetorical manner; perhaps because they were unfamiliar with the concepts presented, or that whilst they were aware of what they should be doing in theory, practice did not always reflect this. Accordingly, the interviews also used 'vignettes' as a way to encapsulate the interviewees' perceptions, opinions, beliefs and actions in context (Barter and Reynold, 1999), and as a way of constructing the embedded project units.

Hill (1997, p.177) defines vignettes as, *"short scenarios in written or pictoral form, intended to elicit responses to typical scenarios."* In practice, vignettes are typically simple 'parables' which describe a set of circumstances that are particularly relevant to the research and allow participants to express views within a more grounded context. Where the study has deviated from conventional methodologies, is in encouraging participants to construct their own vignette from experience, as a means to ground their approach and decision making. This approach proved successful, as interviewees provided more effusive responses when speaking about past or ongoing work and decisions; whilst these vignettes also highlighted some unexpected, but ultimately highly relevant, issues.

From a purely epistemological perspective, it could be argued that allowing each participant to discuss a different vignette, limited the ability to compare responses. However, the need for comparison has never been of particular importance within

this research. Literature reviews highlighted the wide differences of approaches and understandings of resilience, so it was fully expected that there would be diversity in participant responses. Rather, the adopted approach gave greater scope for exploring the mechanisms and motivations behind these differences, rather than relying on a more literal comparison.

More generally, there were several instances where participants made comments after the recording had finished, in effect 'off-the-record', which would prove particularly valuable to the research. Immediately after the interview, the researcher documented a series of reflections on the interview, which would capture these more informal observations within the case study database, such as the participant's attitude to certain lines of questioning. For ethical reasons, 'off-the-record-comments' were never quoted within the thesis text.

This issue highlights the ethical considerations necessary for a qualitative, case study methodology; primarily around confidentiality and anonymity of participants (Yin, 2014). As Stake (2003, p.54) observes:

> *""Qualitative researchers are guests in the private spaces of the world. Their manners should be good and their code of ethics strict."*

In practice, the role and expectations of interview participants was clearly explained in a participation consent form, which outlined their right to anonymity, how data would be used and their right to withdraw from the study at any time, should they so wish. In return, the researcher was honest and transparent about how data would be managed and respectful of potential cultural sensitivities. As such, any comments

that could potentially compromise participants personally or professionally were omitted.[71]

Interviews were fully transcribed shortly after they had taken place, and manually coded for analysis, for example picking out key passages and comparing them to the initial observations in the database[72]. Somewhat surprisingly, there were often little disparities between what participants had said and their attitude when discussing certain subjects. As Gold observes (1997), interviewees' responses can often be flawed by their fading memories, so it is important to check data taken from interviews against other sources. Accordingly, other interviews and documentary sources were used wherever possible to triangulate, "fact-check" and substantiate data (Yin, 2014).

These sources of data were analysed, compared and organised to find patterns, but also to structure the issues in a way that would communicate key understandings to the reader; Yin (2014) refers to this process as forming "chains of evidence." In practice, plans for the eventual empirical chapter would be formed from the interrelated notes and schemas that conceptualised this knowledge (Strauss, 1987). Whilst this was an ongoing process of continual refinement, it became clear that the most appropriate way to organise this data would be by using a series of broad headers, which encapsulate the issues of urban governance from the perspective of local stakeholders. These were:

[71] The study went through an ethical approaval process at the University of Birmingham in November 2012.

[72] Text-based coding software, such as NVivo, was not used. Whilst the researcher did experiment with this type of analysis, it became clear that a simple manual coding approach was more suitable for issues that were often interrelated and context specific.

- Spatial coverage,
- Temporal and scalar involvement,
- Understanding of resilience and engagement with concept,
- Duties, risks and priorities,
- Engagement, collaboration, integration and associated cultures,
- Urban design approaches and guidance,
- Adaptive capacity, institutional thickness and contemporary concerns.

Similarly, the perspectives of five difference groups of stakeholders would form the sections of the chapter for analysis. These were:

- Designers & Other Built Environment Professionals
- Developers
- Local Authority
- LRF and Emergency services
- Environment Agency & Utilities

Sources of secondary data would prove particularly critical for the second part of the case study, which looked at embedded vignette developments. This process of selecting appropriate vignette developments began alongside stakeholder interviews, with participants providing potential projects for study and the researcher using secondary sources to examine the project in greater detail. In addition to semi-structured interviews, the critical sources of information were packs of drawings and reports submitted for planning permission, officer's comments on planning applications, minutes of local planning committees, and local press coverage.

It had been originally anticipated that the design element of the study would be explored through investigating one large project within the case study city, which required consideration of multiple risks, but this would prove problematic. Perhaps as a result of the economic circumstances of the time, there appeared to be few large projects going ahead within the UK. Within the case study area, a large shopping-led development would be cancelled due to concerns around economic viability, whilst developments of new tram infrastructure would not prove possible to investigate without the participation of the key stakeholders.[73]

However, this approach would have ignored the responses received from local stakeholders, who clearly identified that flooding was the most significant risk within the area, and that residential development was the most abundant form of development, but also where risks were most likely to be overlooked. It thus became increasingly clear that embedded units should focus on these issues.

Interviews with stakeholders yielded a large number of potential vignette studies, which were whittled down to a few cases following some analysis of secondary source information. Vignettes were taken forward when they demonstrated lessons learned from how the design and governance of development addressed flood risk; particularly around flood defence, surface water and mitigation arrangements.

[73] As a local authority project, much of the work does not require planning permission, being implemented through community orders. Thus there are no planning drawings available and without the participation of the officers involved, there was insufficient information available for study. Further, many of the designers involved in the project were not local and were therefore difficult to reach.

When looking at how to evaluate these developments, Lawson (2005, p.32) reflects on the great difficulty in judging the success of a design, rather presenting a definition of what comprehensive design should look like:

> *"The optimum solution to the sum of the true needs of a particular set of circumstances."*

What can be taken from this seemingly simplistic statement is that a successful design should respond to its contextual environment. Within this study this primarily means addressing the local risk of flooding, but also considering local and national planning policies and the wider context of good practice in urban design, as outlined within Chapter 2.

However, in keeping with Fisher's (2012) contention that resilience is contingent upon an understanding of failure, the critical lens for this evaluation is the concept of maladaptation (Barnett and O'Neill, 2010), informed by the specific areas of design weakness identified within the multiple case incident analysis. In line with this the design proposals were interpreted from the package of materials submitted from planning permission observations from stakeholders and sites visits. Further analysis was provided by comparison with local and national planning policies and the literature review of urban design which would provide a critical framework for this work; to what extent had the development been informed by earlier paradigms of urban design, and had the scheme incorporated the critical processes sufficiently, as the collaborative understanding of urban design as a socio-technical process proposes. Finally, the extent to which the resulting scheme provided adaptive capacity to the risk of flooding would be considered.

Whilst some of this work was desk based, a series of follow-up interviews were conducted to explore specific issues of the design in much greater detail. There were no standard questions; rather they were bespoke to each vignette and each stakeholder, as a means to understand the rationale for the design, the perceived successes of the approach, barriers to risk reduction and interrogation of why particular decisions had been made and particular approaches used. This work would also highlight the differing motivations of different actors and organisations, as well as the influence on governance arrangements and 'second-order design' upon the process (Adams and Tiesdell, 2011). Finally, the analysis of this data was used to inform lessons with wider national relevance within the thesis conclusions.

Accordingly, the following empirical chapter looks at a wide range of urban incidents, as a means to draw out lessons for wider resilience enhancement as Fisher (2012) advocates, before Chapters 7 and 8 provide detailed empirical evidence on the design and governance challenges Nottingham faces when attempting to enhance resilience.

6 URBAN INCIDENTS' WEAKNESS ANALYSIS

6.1 INTRODUCTION

The literature review of urban design (Chapter 2) concluded that the practice is part of a wider socio-technical process of ongoing, place-shaping (Carmona, 2014; Madanipour, 1996), operating at a scale from detailed design and construction, through to more strategic urban planning concerns, and informed by the "second order" design of urban governance and decision making networks (Adams and Tiesdell, 2011). The preceding chapter followed a format with longstanding precedence in planning circles, reflecting on earlier practice as a means to learn from history, 'recycle' good ideas and avoid earlier mistakes (Hall, 2002; RTPI, 2001). Furthermore, this practice of ongoing reflection and learning also has parallels within the study's governance and urban resilience lenses; where Zolli and Healey (2013) have used reviews of real world examples as 'parables' to draw out simple principles and wider lessons for resilience.

However, Fisher (2012) has suggested that designers of the built environment have been unwilling to acknowledge or understand the mistakes which have led to failures and disasters, perhaps from fear of losing reputation or exposing themselves to potential litigation; however, by looking at these 'design errors' we can use the lessons learned to build resilience within the field. Accordingly, much as Fisher was able to make wider lessons about 'fracture critical design' from the study of the I-35W bridge collapse in Minnesota, so it is the intention of this chapter to look for patterns, lessons and weaknesses contained within earlier events and practice examples, as a means to provide some principles for enhancing resilience.

Furthermore, Fisher's concept of 'fracture critical design' could be said to represent one aspect of a wider phenomenon of what might be termed, maladaptation and maladaptive design; broadly understood to mean a design that is 'inappropriate', no longer 'fit for purpose' or which increases vulnerability (UN-HABITAT, 2011; Barnett and O'Neill, 2010; Supkoff, 2012). These maladaptations can present at different scales, magnitudes and timeframes.

By contrast, it is increasingly understood that adaptive capacity, broadly the ability to change or respond to new contexts and challenges (Jones et al., 2010), whilst simultaneously promoting a more contextual, site specific and local based approach (Galderisi and Ferrara, 2012), holds the key to resilience in practice (Ahern, 2011; Wilkinson, 2011; Goldstein, 2012; Resilience Alliance, 2013; Mehaffy and Salingaros, 2013; Zolli and Healey, 2013). Thus this chapter will also consider a small number of examples that exhibit 'adaptive' measures and context responsiveness.

Increasingly central to this context are the governance principles of collaboration and integration, change management and decision making. Accordingly this Chapter will also attempt to understand, where possible, how these factors have contributed to earlier incidents. The literature review of urban resilience (Chapter 4) concluded that an understanding of risk context, used to inform an appropriate risk assessment management strategy, formed a critical pillar for promoting resilient urbanism.

However, a review of the state of the art in risk assessment procedures within Chapter 4, found no standard methodology for assessing risk in the built environment and a lack of simple, non-technical approaches, which appear to correlate with built environment professions not engaging with risk management, as

part of their *"day-to-day decision making"* (Bosher, 2014, p.9). Further, attempts to utilise risk reduction for enhancing resilience were often hampered by poor timing, in particular risks were not addressed early enough to effect change in a given development (Bosher et al., 2007a; Coaffee and Bosher, 2008; Bosher, 2014).

This study and the parallel DESURBS project, use the international risk management standard ISO 31000 "Risk management – Principles and Guidelines" and ISO 31010 "Risk management – Risk assessment techniques" (British Standards Institution, 2011, 2009), to provide a foundation for risk management practices. This model (see Chapter 4, Figure 4.10), like conceptions of resilience and adaption identified within the literature review, is based upon an understanding of context, but also as an ongoing process with defined actions taking place in a defined order. This chapter will use the three stage process of risk assessment outlined in Chapter 4 (Table 4.2), consisting of: Identify, Determine and Risk Reduction. In effect, this translates to an initial identification of potential vulnerabilities and exposure, followed by a determination of project-specific risk, which allows risk reduction measures to be put in place.

The idea of learning from earlier incidents and utilising risk assessment to target resilience measures, has underpinned the rationale of the DESURBS project[74]. This work presents an analysis of a comprehensive set of hazard incidents – examples of where urban spaces and their users were threatened by the impact of a natural or

[74] Some of the work contained within this chapter was carried out by the author as part of Work Package 1.1 of the FP7 Security Program research project 'Designing Safer Urban Spaces' (DESURBS, Grant Agreement no. 261652).

man-made incident - that can be used to inform the (re)design of safer and more resilient urban spaces.

Furthermore, this chapter is built on the principle that the identification and appropriate analysis of earlier incidents can help to overcome the limitations of stakeholders' knowledge and lack of experience in dealing with these issues, by providing suitable practice examples. The work contained within this empirical chapter comprises of three parts: Urban Incident Database, Design Weakness Examples, and Risk Management Examples.

Firstly, the collation and analysis of a database of international urban incidents, reflecting the man-made threats of terrorism, crowd events, accidents and tunnel collapse, as well as the 'natural' disasters of earthquakes, floods and storms[75]. From these incidents a variety of trends, observations and lessons are identified; which in turn informed the identification of more generic design weaknesses.

Secondly, this chapter provides some more in depth examples of the design weaknesses, to better illustrate their significance to built environment stakeholders and as a means to draw out some simple principles, commonalities and lessons, which can be used to reduce future failures. The third section takes a similar approach, but uses incidents from the database to illuminate the role of the risk management process and the timing of development actions; it also provides some 'adaptive' examples of how the risk management stages can contribute to good practice. The chapter concludes with some lessons, observations and reflections

[75] Note: the DESURBS has a slightly wider scope, whereas this study has a tighter focus on urban design.

gleaned from this work, which can be used to enhance the resilience of cities through urban design, planning and ongoing management.

6.2 URBAN INCIDENT DATABASE

The core of this empirical chapter lies with the creation of a database of urban incidents, as a means to track and analyse details that have contributed to disaster or near-disaster events. Having established that these urban incidents occur as a result of failures or lapses in the combined physical, communicative and management systems (Fisher, 2012), the information gathered from these cases can be used to identify potential adaptive measures for the design of urban spaces and to make them more resilient.

Chapter 5 outlined the methodology utilised in establishing the database; over 200 incidents were analysed, within a variety of urban locations and considering the impact of six urban hazards: Terrorist Events, Urban Accidents, Crowd Events, Tunnelling and Ground Movement, Earthquake, Floods and Storms.

Incidents were analysed according to the type of hazard and by the spaces in which they took place, in order to understand how their planning and design was initially carried out and to identify if any weaknesses within the design had contributed to its occurrence and impacts. These provided some broad trends about how the design, governance and management of urban spaces had created vulnerabilities; therefore addressing these weaknesses could potentially be used to reduce the impact of similar incidents in the future. In particular, details of adaptions or post-event

reconstruction often proved to be revealing, suggesting where failures or weaknesses had earlier occurred.

Identification of Design Weaknesses

The incidents within the database provide a large cross section of urban disasters and their causes, which were often similar in nature. Accordingly, some general observations about this process can be made.

As noted in Chapter 5, academic sources were difficult to find and there were varying degrees of transparency and openness varied between types of incident. This also appeared to be true of different nations, but even within the UK where information was easily accessible, it was very difficult to find information about risk assessment methods and approaches. This demonstrated not only the lack of standard methodologies for risk assessment in the built environment, but also a lack of scrutiny about how it is practiced. However, with knowledge of the risk assessment stages it was sometimes possible to ascertain the failures of this process; e.g. was it a failure to identify a potential hazard, were they aware of the exposure or vulnerabilities, was there a failure to act upon this information?

The central purpose of this study is to use practice examples to draw out principles with wider relevance. From the analysis of the incidents, it was found that there are broadly three areas of responsibility, which influence the resilience or weakness of urban space:

- *Design & Construction* – the designs, materials and constructions used, the employment of comprehensive modelling of known or suspected threats and risks and the inclusion of design measures to mitigate against these risks.
- *Planning & Governance* – the establishment of frameworks within which urban spaces are shaped which include planning policies, construction codes and guidance and the establishment of procedures for its design, construction and use.
- *Management* – the use of the space and the way in which it is monitored, managed and maintained so as to minimise the risk of incidents occurring.

These responsibilities represent different points in the process of planning, designing and realizing urban space but the manifestation of weaknesses in them can occur in different ways. Analysis further identified a more detailed breakdown of lessons learned based upon nine categories of design weakness, with many incidents displaying multiple weaknesses. These are listed below indicating their connection to the considerations above and providing definition of how they are manifest:

Urban Planning Weakness (Planning & Governance, Design & Construction)

Where a weakness has arisen as a result of failures in planning policy and procedure. More specifically, where there has been inadequate or flawed consideration of potential risks at a land-use, individual site or strategic planning level, including relevant emergency planning.

Architectural Design Weakness (Design & Construction)

Where a weakness has occurred as a result of design and construction failures of built environment elements. This includes inadequate consideration of the processes taking place within the space or where the built elements impede the effectiveness of safety and security functions.

Site Management and Monitoring Weakness (Management)

Where a weakness has developed as a result of management failures or inadequate monitoring. This includes instances where the lack of management and monitoring is the cause of the weakness or has contributed to a weakness. Typically it involves safety and security measures, but also includes consideration of ongoing works to the built environment and their impact upon the contained processes and functions.

Structural Weakness (Design & Construction)

Where weaknesses have occurred as a result of a structural failure, due to lack of structural integrity or insufficient robustness. Typically this relates to elements of the built environment which have been inadequately designed or constructed.

Materials Weakness (Design & Construction)

Where weaknesses have occurred as a result of inadequate performance or specification of construction materials, within the built environment.

Maintenance Weakness (Management)

Where a weakness has arisen as a result of inadequate maintenance to built environment elements and processes. This includes both routine maintenance and

the reactive repair of defects within the site, buildings or to equipment vital to the sites successful function.

Hazard Mitigation Weakness (Planning & Governance, Design & Construction, Management)

Where a weakness has arisen as a result of inadequate hazard mitigation procedures. This is typically a result of deficiencies within the risk management process.

Emergency Response Weakness (Planning & Governance)

Where weaknesses have occurred as a result of a failure in the emergency response. In particular, where the emergency response (or lack thereof) has caused, exacerbated or contributed to the incident.

Stakeholder Involvement Weakness (Planning & Governance, Design & Construction, Management)

Where a weakness has occurred as a result of inadequate engagement with appropriate stakeholders. In particular, where the design and construction of the built environment has commenced without key stakeholder inputs.

The following section will attempt to unpick these design weaknesses, using case examples.

6.3 DESIGN WEAKNESS EXAMPLES

Following the identification of these design weaknesses, the incidents were re-evaluated with the intention of establishing 'detailed' cases, where a comprehensive timeline of the event could be ascertained with regard to these weaknesses[76].

In line with the methodology outlined in Chapter 5, real-world, case examples were used to illustrate and draw out key lessons from the design weaknesses to assist with the process of designing urban space in a more resilient manner.

Each example below provides an overview of the incident and how the weakness manifested itself in that particular scenario, the impact that the weakness created within the incident, as well as the adaption and mitigation measures employed following that incident to address the failings uncovered. Furthermore, the fundamental failures of the case and thus the appropriate design weakness are highlighted as a key lesson, whilst a 'resilient response' is indicated to illustrate how a particular weakness could have been avoided.

Urban Planning Weakness

Urban Planning Weaknesses are characterised by failures in planning policy or practice, from which inappropriate or incompatible land-uses develop, often as a result of inadequate consideration of potential risks and vulnerabilities. The flooding which occurred in Carlisle in 2005 is a good example of this weakness; illustrating both a basic failure to address the potential exposure of new residential developments within areas of floodplain, but also a more serious failure from

[76] Incidents without the necessary information were omitted from the updated database.

locating critical infrastructure in areas particularly vulnerable to flooding, and thus making the whole system 'fracture-critical'[77].

On the 8th of January 2005 and following persistent heavy rainfall, the Rivers Eden, Caldew and Petteril, which all converge upon the town of Carlisle, burst their banks causing severe flooding within the area. In total, over 1,700 homes were flooded, three lives were lost and critical emergency infrastructure was also badly affected; illustrated by the image of swamped Police vehicles, which were not able to assist recovery efforts; see Figure 6.1.

Figure 6.1 – Photograph of Carlisle Floods

(Source: supplied by Cumbria Fire and Rescue Service)

Looking at the settlement pattern of the town revealed the origins of the disaster. As with many historic British towns, Carlisle was located adjacent to a river, making it

[77]Information on the Carlisle floods was drawn from a number of sources, but most importantly: Cumbria Fire and Rescue Service (2010), EA, (2014), BBC (2015).

inherently liable to flood. However, this had been compounded by 20th Century planning and developments, which had overseen the expansion of the town but failed to address this vulnerability. In particular, extensive new residential developments were allowed within the flood plain. Not only were these areas particularly vulnerable to flooding, but the loss of flood plain capacity contributed to more severe flooding elsewhere.

In addition to the many homes and businesses affected by flooding, the town's critical infrastructure was also severely impacted, drastically hampering emergency response efforts. Notably, the area's Police, Fire and Rescue Services, as well as the telecommunications facilities were located close to the river, with no special protection against flooding. This demonstrated a lack of risk management and prioritisation, in simple terms not providing extra protection to important services.

Subsequent adaption strategies, based upon a hierarchy of risk management approaches, laid bare the disaster's urban planning failings which had failed to consider vulnerabilities or prioritise different strategies of risk reduction. The town's residential suburbs were surrounded by new flood walls, whilst the town centre received greater protection in the form of new flood walls, embankments and a pumping station, to protect local infrastructure including roads and medical facilities. Finally, Cumbria's Police and Fire Services were moved out of Carlisle to a new, less vulnerable location.

These adaptations demonstrate the necessary resilient response, based upon a risk/vulnerable assessment, enabling decision makers to prioritise resources to where they are most needed, to ensure a proportionate response.

Other examples of Urban Planning Weaknesses include the ongoing flooding of York, most notably in 2000, caused once again by residential development within the area's floodplain. In particular, by allowing an expansion of non-permeable surfacing, which increased the volume of surface water run-off, recent planning decisions contributed to worsening flooding within the area.

A non-flood related Urban Planning Weakness is illustrated by Buncefield Oil Depot; when an explosion occurred at the depot in 2005, leading to the evacuation of 2,000 homes and many more businesses. Allowing such a potentially hazardous industrial activity, so close to commercial and residential properties, was a failure of urban planning systems to consider the compatibility of adjoining uses and enforce a stand-off for this potentially hazardous activity.

Architectural Design Weakness

Architectural Design Weaknesses are characterised by built environment elements that either do not consider the potential vulnerabilities and requirements of their given use, or actively impede these in relation to safety and security. The design of the Glasgow Airport terminal buildings which failed to include measures to address hostile vehicles or vehicle-born explosives, provide a useful illustration of this weakness[78]

On the 30th June 2007 terrorists drove a jeep loaded with propane canisters into the glass doors of the Glasgow International Airport terminal and set it ablaze. The car's driver was severely burnt in the ensuing fire and five members of the public were

[78] Information on the Glasgow Airport attack was drawn from a number of sources, but most importantly: BBC, 2008a.

also injured, none seriously. However, the attack is estimated to have cost £2m including repairs to the terminal building, with a further £4m spent on security adaptions. See Figure 6.2, below

Figure 6.2 – Aftermath of Glasgow Airport Attack

(Source: Wikipedia, 2007 - ©Thomas Nugent[79])

It is believed that the attackers had intended to drive the vehicle into the terminal building itself, before setting it on fire, but were stopped by security bollards outside the entrance. However, the architectural design of the terminal building, with a drop off so close to a major entrance, was inherently vulnerable to terrorist attack; given the targeting of air travel by terrorists, this threat should have been considered.

Once again, post-incident adaptions hinted at ways the event could have been avoided, with the airport operator BAA installing a number of new security features, including concrete barriers, CCTV cameras and restricted vehicular access to the

[79] http://en.wikipedia.org/wiki/File:The_Aftermath_-_geograph.org.uk_-_485211.jpg#filelinks

area. However, whilst the incident was made possible by the original design, it was only within the last 15 years that the terrorist threat to airports has become manifest; in effect the rise of terrorism made the original design maladaptive. This also highlights the need for ongoing considerations of both risk and the suitability of the built environment for todays and perhaps tomorrow's needs, as Chapters 2 and 4 highlighted. A resilient response would have been to locate vehicle access away from terminal building, or retrofit with hostile vehicle mitigation, if this was not possible.

Other examples of Architectural Design Weakness include the 1996 Manchester bombing, where architectural design measures at the site of the blast could have prevented the use of vehicle-borne devices. In the case of the devastating Kings Cross fire of 1987, it was found that the design of the underground hall and escalators functioned as an incinerator, drawing in air and fuelling the blaze.

Site Management & Monitoring Weakness

The Site Management & Monitoring Weakness can be identified by a failure to enact site management procedures or as a result of inadequate site monitoring, particularly in relation to safety and security. The Duisburg Love Parade event, where organisers failed to plan or implement appropriate site management, or put in place appropriate safety monitoring measures, provides an apt demonstration of this weakness.[80]

[80] Information on the Love Parade disaster was drawn from a number of sources, but most importantly: Love parade website, 2010; de Spiegel, 2010; Crowd Management Strategies, 2010.

At the Love Parade musical festival in Duisburg, Germany, held on the 24th July 2010, a serious crowd crush incident led to the deaths of 21 people and injured 500 more. See Figure 6.3, for image of event.

Figure 6.3 – Love Parade Crowds

(Source: Wikipedia, 2010 - ©Arne Müseler[81])

Whilst the city permit allowed for 250,000 visitors and local police had made preparations for around 400,000, it was estimated that 1.4 million people had attended. In simple terms, too many people were allowed to enter a venue with too little space. Whilst this was compounded by inadequate stewarding, crowd management and monitoring, the single point of access and exit was the critical failing and where the deadly crush occurred. The incident highlights how site management is not only about on the day activities, but also involves the preparation of operating and emergency plans.

[81] http://en.wikipedia.org/wiki/Love_Parade_disaster#/media/File:2010_07_24_arne_mueseler_0223.jpg

Subsequently, the event will not be held again and German regulations have been changed as a result, requiring more exits with better monitoring of visitors. A resilient response would ensure that site management plans are in place for a given number of visitors, and that they are implemented and monitored accordingly, with suitable accommodation for both access and egress.

Other Site Management & Monitoring Weakness examples include the bombing at the 1996 Atlanta Olympic Park, where a failure to evacuate the park following a coded warning to the police, left one person dead and 11 more injured. Furthermore, better site monitoring could have detected the device earlier. Another crowd event example would be the 1989 Hillsborough Stadium Disaster, which occurred when large numbers of football fans were directed into two fenced and contained pens, but without sufficient stewarding to prevent entrants beyond the pens capacity of 2,000 people.

Structural Weakness

The Structural Weakness is characterised by inadequate structural integrity or robustness, as a result of defective technical design or construction techniques. The Lorca earthquake, where there were widespread structural failures and a lack of building code enforcement, in spite of the locations seismic vulnerability, is a good demonstration of this weakness.[82]

[82] Information on the Lorca Earthquake was drawn from a number of sources, but most importantly: BBC, 2011a, 2011b, 2011c.

On 11th May 2011, a moderate 5.1Mw earthquake struck the Spanish town of Lorca, causing massive damage to buildings, nine deaths and many more injuries from falling rubble. See Figure 6.4, for an image of the aftermath.

Figure 6.4 – Earthquake Damage in Lorca

(Source: supplied by © Alex Barbat, CIMNE)

The scale of devastation within the town surprised many, given the relatively minor nature of the earthquake, and its location within an area of known seismic activity. Geology experts argued that not only should buildings have withstood the event, but that 'pre-existing structural problems' could be the only explanation of why so many collapsed. More specifically, there had been a widespread failure to make ongoing structural repairs following earlier events, or more general structural improvements necessary within an area of heightened seismic risk.[83]

[83] The municipality of Lorca will receive 21 million Euros from the European Union Solidarity Fund, for new infrastructure. However, it is unclear at this time, what mitigation measures will be put in place.

The resilient response would be to ensure that the necessary structural design is part of local building codes within areas vulnerable to earthquake, whilst existing buildings should be subject to ongoing inspection, evaluation and if necessary, remedial works to ensure they are sufficiently structurally robust.

Other Structural Weakness examples include the Christchurch earthquake of 2010, which destroyed or badly damaged many of the city's historic buildings, indicating a fundamental structural weakness. The terrorist attacks of September 11th on the World Trade Centre, New York highlighted a number of structural failings; most notably, 'truss floor' designs, where flows were 'hung' from the outside walls and were susceptible to systematic collapse in the event of one or more floors giving way.

Materials Weakness

The Materials Weakness is the result of inadequate performance or specification of construction materials, particularly to a given vulnerability. It is well illustrated by the Manchester IRA bombing, where the use of insufficiently robust materials, in this example glass, greatly amplified the impact of the explosion.[84]

On the 15th June 1996, the Provisional Irish Republican Army (IRA) carried out an attack on Manchester, England, using the largest peacetime bomb ever detonated in Great Britain. Whilst the area was successfully evacuated before the blast, there was considerable destruction of property, estimated at £250m (€298.4m), as well as significant damage to the city's economy. Further, 220 people were injured, mostly

[84] Information on the Manchester IRA Bombing was drawn from a number of sources, but most importantly: London Prepared, 2012; Manchester Evening News, 2014.

by flying glass, a predominant construction material of surrounding buildings, and whose failure exacerbated the impact of the event. See Figure 6.5, for aftermath image.

Figure 6.5 – Aftermath of 1996 Manchester Bombing

(Source: Manchester Evening News, 2014[85])

The extensive reconstruction that took place within Manchester, demonstrated a number of adaptions to ensure that the problems highlighted by the event were addressed. These included the designing of 'stand-off' areas between publicly accessible roads and high profile buildings using crash rated security bollards, CCTV and the extensive use of bomb proof glazing. A resilient response would minimize the use of glass within public buildings or potential terrorist targets, or utilise blast-proof glass.

[85] http://www.manchestereveningnews.co.uk/news/greater-manchester-news/ira-manchester-bomb-anniversary-readers-7271141

Other Materials Weakness examples include the Brisbane floods, where the use of non-permeable pavements were found to have reduced natural infiltration of water and increased surface water run-off. Whilst the use of hazardous materials in the construction of the World Trade Centre, including over 2,000 tonnes of asbestos, led to the release of significant amounts of toxic debris into the atmosphere, following the collapse of the towers.

Maintenance Weakness

The Maintenance Weakness is the result of a failure to adequately maintain the built environment, including both routine maintenance processes and addressing defects. The 1987 Kings Cross Fire, where failures to enforce a 'no smoking' policy and maintain the site, led to a devastating fire.[86]

On the 18th November 1987, a massive fire at the Kings Cross Underground Station led to the deaths of 31 people and more than 60 injured, whilst the station was partially closed for 15 months. The investigators found a large build-up beneath the escalators of grease, discarded tickets, sweet wrappers, fluff from clothing, and both human and rat hair that not been cleaned since the escalator was constructed in the 1940s; they concluded that a discarded match had ignited this material and started the fire. See Figure 6.6, for an image of the fire damage.

[86] Information on the Kings Cross Fire was drawn from a number of sources, but most importantly: Fennell (1988) and BBC (2008).

Figure 6.6 –Fire Damage at Kings Cross Station

(Source: BBC, 1987[87])

The event was the catalyst for new legislation; the Fire Precautions (Sub-surface Railway Stations) Regulations 1989 led to a variety of adaptions, including the replacement of wooden escalators, installation of sprinklers and smoke alarms, and rigorous staff fire training with the appropriate emergency services. However, the resilient response would be to ensure a robust maintenance programme, including thorough cleaning, is implemented and that safety regulations are enforced.

Other Maintenance Weakness examples include the L'Aquila Earthquake, where the ineffective maintenance of historic buildings is believed to have led to their collapse during the 2009 earthquake, rather than during earlier more powerful seismic incidents. Similarly, the devastating 2005 floods in the Indian state of Maharashtra,

[87] http://news.bbcimg.co.uk/media/images/64215000/jpg/_64215784_64215783.jpg

which led to the deaths of over 1,500 people, were found by investigators to have been exacerbated by inadequate maintenance of the region's drains and sewers.

Hazard Mitigation Weakness

The Hazard Mitigation Weakness is characterised by deficient hazard mitigation measures and deficiencies in the risk assessment process. This weakness is well illustrated by the impact of 'Superstorm Sandy' upon New York, where a failure to address underlying vulnerabilities, was exposed by a storm surge which overwhelmed the cities mitigation measures.[88]

On the 26th October 2012, the tropical cyclone Hurricane Sandy which had devastated portions of the Caribbean, made landfall on the Mid-Atlantic and North-eastern United States, pushing a major storm surge which caused severe flooding in New York. The city's scant flood walls and defences were overwhelmed, flooding streets, tunnels, subway lines and most notably, the city's main energy plants at Battery Park, which led to widespread electricity blackouts. This loss of power would prove to be 'fracture-critical' as hospitals lost power and much of the city was without potable water, being reliant on electricity for pumping. See Figure 6.7, for an image of the flooding.

[88] Information on the impact of Hurrican Sandy on New York was drawn from a number of sources, but most importantly: NYSERDA, 2011, NYS2100 Commission, 2012.

Figure 6.7 – Flooded Streets of New York, 2012

(Source, Daily Telegraph, 2012[89])

Whilst only one life was lost within the city, the cost of damage is estimated at over $71.4 billion in the US alone (2012 USD), and it is recognised that New York came close to a much more serious disaster. Ironically, earlier city risk reports had highlighted the vulnerability of New York's infrastructure to flooding, but policy makers had delayed action.

Despite the relatively short time since the disaster, New York has seen a host of initiatives to boost the cities resilience to these types of event, including changes to building codes and major initiatives to secure the long term future of the city, such as 'Rebuild by Design'. The initiatives are covered in greater detail by Chapter 9. However, the resilient response would be to assess likely height and spread of floods

[89] http://www.telegraph.co.uk/news/worldnews/northamerica/usa/9644856/Hurricane-Sandy-live.html

and improve flood defences where necessary, as well as prioritising mitigation around critical infrastructure.

Other Hazard Mitigation Weakness examples include the 2010 Brisbane Floods where the absence of any meaningful flood defences, greatly increased the scale and impact of the incident. More significantly, the 2011 undersea earthquake and resulting tsunami that hit the coast of the Japanese province of Tohoku with 10m+ waves, would overwhelm the Fukushima Nuclear Power Station's 3m high protection walls, destroying the plants cooling systems and starting a chain of events that led to a nuclear meltdown.

Emergency Response Weakness

The Emergency Response Weakness is the result of failures in emergency response, often resulting from inadequate consideration of potential barriers to emergency procedures. This is illustrated by the circumstances surrounding the 7/7 Public Transport Bombings on London, where confusion over communication between responders and front-line staff hampered relief efforts.[90]

The 7 July 2005 London bombings (often referred to as 7/7) were a series of co-ordinated suicide attacks in London, United Kingdom, which targeted civilians using the public transport system during the morning rush hour. In total, 52 people were killed and over 700 injured; the communications failures had a significant impact on the post-incident care of survivors. See Figure 6.8, for a post-incident image.

[90] Information on the impact of the 7/7 London Bombings was drawn from a number of sources, but most importantly: House of Commons (2007).

Figure 6.8 – A London Bus following 7/7 Attack

(Source: Guardian, 2011[91])

As Mobile networks were overloaded with demand, requests for further ambulances, supplies and equipment did not get through, and there was general confusion regarding what was happening elsewhere. This breakdown in communications led to a failure to deploy the right numbers of ambulances to the right locations; a lack of necessary equipment and supplies at the scenes; and delays in getting some of the injured to hospital.

A number of mitigation measures were put forward by the coroner at the conclusion of the inquest into the deaths during the incident, including: improved training, communications and exercises between transport groups and emergency services. The resilient response is to ensure that there are adequate emergency planning and

[91] http://www.theguardian.com/uk/2010/oct/11/july-7-inquests-begin

communication procedures for both emergency responders and frontline transport staff.

Other Emergency Response Weakness examples include the Mumbai terrorist attacks, where national security forces took 10 hours to arrive at the scene and 72 hours before they could bring the events under control, leading to many casualties. At the Buncefield Oil Depot explosion, emergency information and procedures was not available to the blue light services, with key safety documents located within the affected site/buildings, and consequently destroyed.

Stakeholder Involvement Weakness

This Weakness is characterised by a lack of stakeholder engagement, particularly when developments proceed without the input of key actors on safety and emergency response issues. It is illustrated by the impact of Hurricane Katrina on New Orleans, where the disaster was compounded by the inability of approximately 100,000 residents to leave the city, and the inadequacy of the regional evacuation plan.[92]

On the 25th August 2005 the tropical storm, "Katrina" produced a storm surge, which led to breaches in the levee system protecting New Orleans, resulting in major flooding across the city and the loss of more than 1,800 lives. The impact of Hurricane Katrina on the city highlighted the unpreparedness and lack of co-ordination by and between local, state and national government stakeholders. Critically, residents hadn't been involved or made aware of evacuation plans in the

[92] Information on the impact of hurricane Katrina was drawn from a number of sources, but most importantly: Hurricane Katrina website (2015) and Washington Post (2013).

event of such an occurrence. Furthermore, the city proved to be 'fracture-critical', with a total failure of critical facilities and emergency response, leaving many residents stranded in flooded areas. See Figure 6.9, for images of flooded city

Figure 6.9 – Flooded New Orleans

(Source: Wikipedia, 2005 - ©US Coast Guard[93])

It is unclear at the present time, what mitigation has been put in place, in light of the weaknesses exposed by this event, but a resilient response would ensure that all relevant stakeholders were engaged in emergency planning and co-ordinated response preparation.

Other Stakeholder Involvement Weakness examples include the Buncefield Oil Depot explosion, where local stakeholders, including residents and businesses, were unaware of the potential explosion risk or what to do in the event of such an

[93]http://en.wikipedia.org/wiki/Effects_of_Hurricane_Katrina_in_New_Orleans#/media/File:KatrinaNewOrleansFlooded_edit2.jpg

explosion. Following the devastating Haitian Earthquake in 2011 the lack of decentralised administration, such as no resources being available outside government buildings, led to an inability to implement effective emergency response programmes.

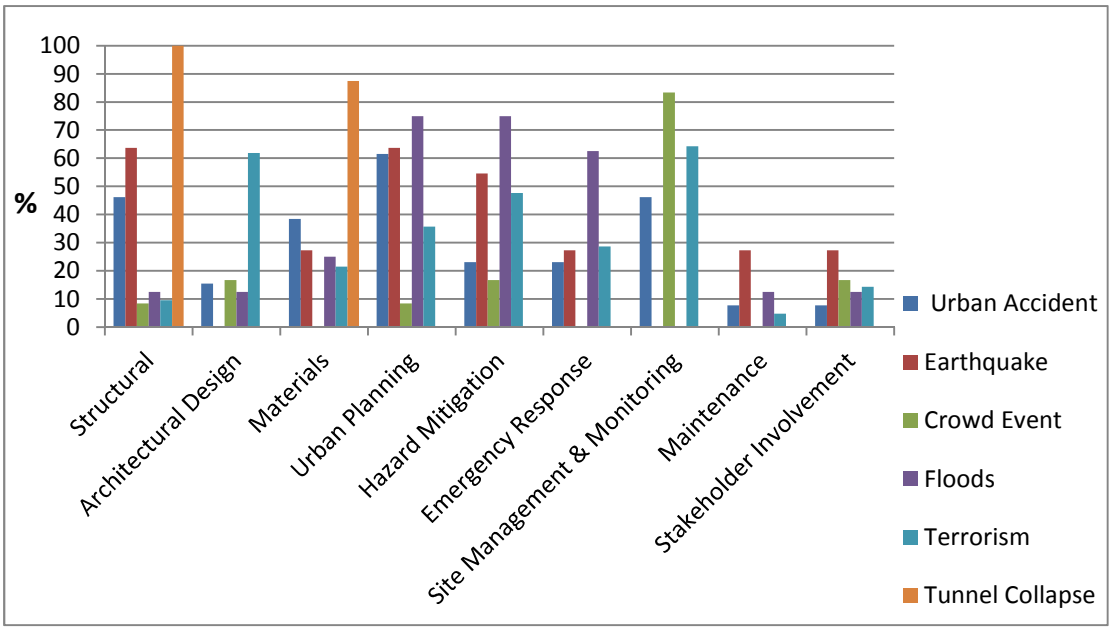
Design Weakness Analysis

These examples, and the design weakness they illustrate, demonstrate the complex interactions between design and management with wider national and local governance processes, which all contribute towards disaster incidents and erode resilience.

It is noteworthy that the incidents were often the result of multiple weaknesses and failures, in some cases cascading, whilst the examples also demonstrate a variety of different speeds and scale of impacts. For example, the Carlisle floods, and the events following Hurricane Sandy and Hurricane Katrina, could all be said to be 'fracture-critical', whilst the effects of others were more localised disorder, with little wider impact. It is interesting that these three fracture-critical examples all feature flooding. Whilst it could be argued that the Haiti earthquake was also fracture critical, many of the lives lost were due to the lack of clean drinking water.

However, it becomes clear that the weaknesses also have associations with different types of hazard; below is a brief overview of the design weakness significance on a hazard by hazard basis, as a means to further understand this relationship; see Figure 6.10.

Figure 6.10 – Incidents by Type and Weakness



(Source: Author's research data)

Urban Accidents

Given the varied nature of the urban accident cases, it is perhaps unsurprising that they exhibit a varied spread of design weaknesses. In particular, the examples of roof collapses have almost exclusively been the cause of structural and materials weakness. However, the analysis of weaknesses uncovers a key theme in the cause of urban accidents; the contribution of urban planning to the siting of hazardous materials and activities, but also the role site management and monitoring plays in overseeing these hazardous issues. By contrast, the actual design of spaces is less significant to the causes of urban accidents.

Earthquakes

Given that the impact of earthquakes is primarily upon buildings, it is logical that weakness in structural design and materials would be significant. However, failures in urban planning and hazard mitigation has also proved an important contribution to earthquake disasters; essentially by promoting unsuitable or inadequate development in earthquake prone areas, or providing insufficient hazard mitigation to meet this hazard. This hazard also demonstrates that there are areas of overlap within the weakness; structural weaknesses could be said to be part of wider architectural design, whilst in the event of an earthquake, site management could be said to be part of emergency response.

Crowd Events

The site management and monitoring weakness was clearly identified as overwhelmingly the key issue in crowd events, both on a case by case basis, and collectively. However, analysis of the events demonstrates how the design of the space, the suitability of its location, appropriate hazard mitigation and the involvement of stakeholders, can contribute to both good and bad outcomes.

Floods and Storms

Whilst a broad range of weaknesses were found to have contributed to flood events, it was clear that three factors were particularly important; urban planning and locating developments in unsuitable, flood-prone locations; providing inadequate flood mitigation, and failings in the emergency response.

Furthermore, whilst the urban design did not obviously contribute to the weakness, there is widespread acknowledgement that the use of impervious surfacing is a contributing factor to flooding (White, 2010; Scott, 2012), whilst reviews of good practice emphasise the positive role of good design in controlling the floods and storms hazard (CIRIA, 2013).

Terrorist Attacks

The terrorism incidents highlighted a diverse range of weaknesses, consistent with attackers actively looking for weak points. Whilst there are implications for all areas of responsibility, it is apparent that the design and management of spaces is particularly important. A wider trend is that spaces become vulnerable, when they fail to respond to new threats, in effect maladaptive, such as the attacks on public transport.

Tunnel Collapse

In all cases, tunnel collapses were caused by structural weakness and with only one exception by materials weakness. Further, no other weakness was identified for this hazard. It therefore seems appropriate to omit this hazard from further analysis within the study, being largely a specialist engineering concern, rather than one that is within the core process of urban design.

6.4 RISK MANAGEMENT STAGE EXAMPLES

The analysis of design weaknesses uncovered a number of commonalities between hazards and some wider lessons for design practice. However, the critical issue that emerges is about ensuring there is the correct consideration or intervention, at the

right time, appropriate to different hazards, and that this occurs at the correct scale to allow successful intervention (Bosher et al., 2007a; Coaffee and Bosher, 2008; Bosher, 2014).

The approach of this chapter has been to explore and evaluate methods and approaches through the use of practice examples, and this section uses the same format to evaluate how risk assessment and risk reduction are temporally utilised at different scales. In addition to questions of timing, the areas or scales of responsibility emerged as an important consideration within the incidents. Similarly, within Chapter 3, Allmendinger and Haughton (2009) also noted that planning has itself undergone a 'restless' search for the most appropriate scale to tackle different issues; most recently with the shift to 'localism' that accompanied the NPPF. The following examples will also illustrate how temporal and scalar involvement of stakeholders can be reconciled by following a sequential, risk management approach.

Moreover, a key question identified within academic examinations of the concept of resilience, is 'resilience to what?' (Vale, 2014); thus it is argued within this study that an understanding of the 'risk landscape', in terms of overall risk, potential vulnerabilities and exposure, identifies where to target measures to enhance resilience, as well as providing an evidence base for the work. Thus the examples within this section are structured according to the three risk management stages identified in the introduction to the chapter and which need to be considered in a sequential order. The examples given will reflect upon incidents which displayed both good and bad practice, with a focus on flood and storm examples.

Risk Management Stage – Identify

The 'identify' risk stage involves the early identification of potential hazards and potential vulnerabilities, at the onset or strategic planning stage of a development. It is argued that this is primarily the responsibility of planning and urban governance to recognise the higher level risks associated with this risk assessment stage.

An example of a failure at this stage is the 2010 and 2011 floods which hit Queensland Australia and the state capital, Brisbane. As a result of these floods, 35 people were killed and many thousands forced to evacuate homes, whilst the financial costs are estimated as A$2.38 billion in damage and a further A$30 billion reduction in Australia's national GDP.

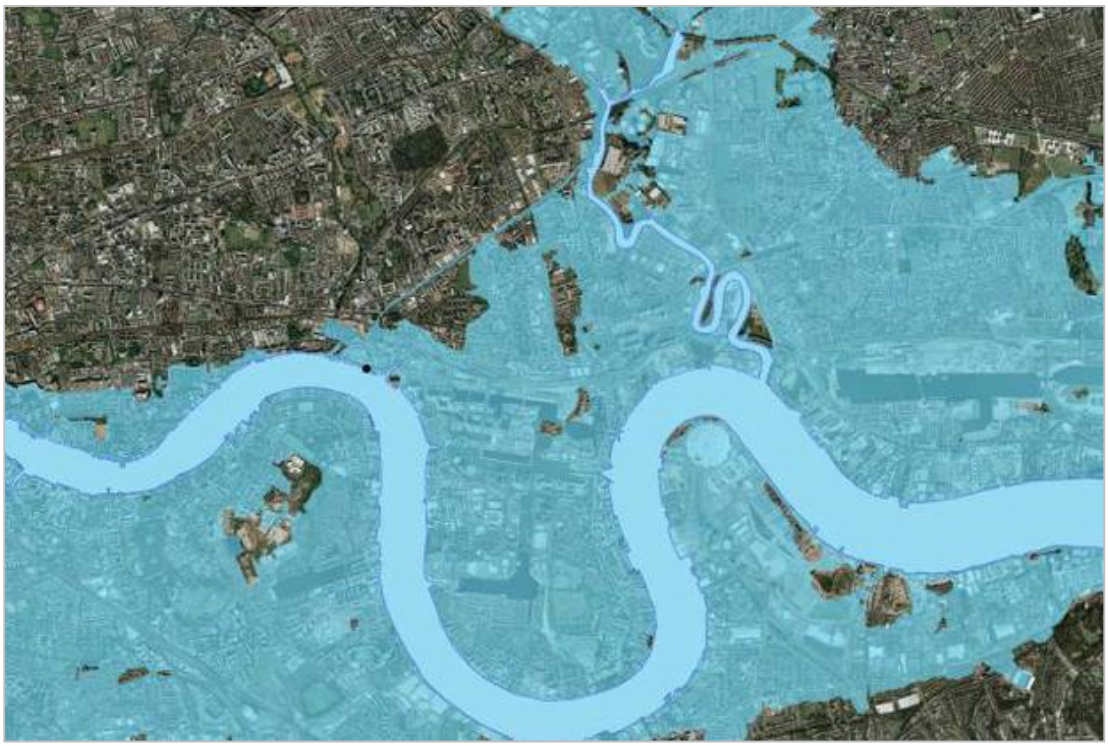
In the aftermath of the event there was severe criticism of the Queensland Government's failure to identify the state's serious potential for flooding, meaning that almost no other action was put into place to either assess or mitigate the flooding hazard. Queensland had little flood mitigation, significant housing development within the floodplain and unchecked afforestation, which all contributed to the severity of the disaster. An independent WWF report on the event suggested that flooding was not a political priority in the state and thus no sort of policy was ever put in place to address it.

A more positive example would be the Thames Barrier which protects London from storm surges and sea flooding. Following the 1953 North Sea Flood, where parts of East London were flooded and central London was also threatened, a report was commissioned to consider the potential impact of a storm surge upon the nation's

capital. Published in 1966 and authored by Sir Herman Bondi, the report looked at potential tidal and fluvial levels and the impact these would have upon London, concluding that the exposure of critical facilities and national infrastructure (such as Parliament and many Government Ministries) meant that action needed to be taken to protect these assets.

This identification was the first stage in a process that led to the eventual construction of the Thames Barrier in 1983. According to the Thames Barrier's official website (GOV.UK, 2015), there have been 119 flood defence closures between opening in 1983 and 2010; of which 76 were to protect against tidal flooding and 43 were to alleviate fluvial flooding (there were five additional closures on 27 December 2012 – 1 January 2013). During this period London has not experienced any significant flooding as a result of tidal surges and high tides. Figure 6.11 shows parts of London that would have been flooded in 2013, if the barrier wasn't present.

Figure 6.11 – Inset of London Flooding without Thames Barrier



(Source: Metro, 2013[94])

These two examples demonstrate the importance of government institutions in identifying potential threats and hazards. It could also be said that the Queensland example demonstrated a lack of foresight integrated into policy, and unwillingness to consider adaptive measures or to limit existing development practices. Furthermore, many of the earlier incidents, such as the Oklahoma bombing, were also a result of failures to identify potential hazards or threats at the earliest stage, which led to the overlooking of more detailed design weaknesses.

[94] http://metro.co.uk/2013/12/07/thames-barrier-saved-london-following-biggest-tide-in-60-years-what-the-damage-could-have-been-like-4221964/

Risk Management Stage – Determine

This risk stage involves the determination of a given risk to a specific development, considering both the underlying vulnerabilities of their location and thus the suitability and challenges presented by a particular development, to give an overall assessment of risk. Occurring at the outline planning/design stage, it requires planners and designers to come together and consider both the likelihood of an event occurring and its potential impact.

An example of a failure at this stage would be the risk assessment methodology used for the federally maintained levees protecting New Orleans from flooding, and whose failure was described in the previous section, following Hurricane Katrina. A June 2007 report released by the American Society of Civil Engineers blamed the US Army Corps of Engineers, who by federal mandate are responsible for the conception, design and construction of the region's flood-control system, for failing to carry out a thorough risk assessment which considered public safety and the potential impact of such an event on New Orleans. Whilst the potential hazard of flooding/storm surge was identified by the Corps, the risk assessment did not consider the potential exposure/impact on New Orleans in the event of levees failing. Instead having calculated that a serious storm event was likely to be infrequent, minimal resources were invested in the upkeep of the levees.

The New Orleans example illustrates the consequences of a flawed risk assessment process, considering only the likelihood of the event occurring and the cost necessary to prevent it. A successful risk strategy would have utilised a risk matrix which studied both the likelihood of the event occurring, as well as the potential

consequences if it did occur, when determining the overall risk. The outcome would have concluded that it was necessary to put greater resources in place to prevent such an event ever occurring and hence the risk assessment process was at fault for this disaster.

A good example of how to address this risk stage is provided by the Ring Dike which protects South Holland. The South Holland floods of 1953, which led to 1,835 deaths and 70,000 people being evacuated, spurred the country to take a new approach to determining and acting on flood risk. The result was the Delta Works; a ring of dams, dikes, locks and sluices, that provided appropriate levels of flood protection across Holland.

The degree of protection necessary was determined by cross-calculating the cost of flooding (assessed using a statistical model involving damage to property, lost production, and a given amount per human life lost) against the probability of it occurring (using data from a purpose-built flood simulation lab, as well as predictions of water levels and pressure from waves). This risk assessment process calculated that the area required protection against incidents up to a 1 in 10,000 year sea flood, whilst this framework of considering land-use, potential for flooding and resultant cost benefit, still forms the basis of decision making for flood risk in Holland today. Further, the Dutch risk assessment methodology has recently been shown to provide a sufficiently robust decision making process to factor in future sea-level rises from global climate change (Klijn et al., 2012), and effectively illustrating the value of a well-developed risk assessment methodology.

Both of these examples demonstrate the importance of considering exposure, in essence what could happen if such an event occurs, and why it is potentially more important than quantitative measures of likelihood, echoing the lessons of White (2013) on the limitations and inherent mistakes of this type of approach. Putting together a context specific risk matrix, and prioritising different assets, which can inform a hierarchy of interventions, has particular relevance for risk reduction approaches.

Risk Management Stage – Risk Reduction

This risk management stage involves the consideration and design of measures to reduce a known risk. Accordingly, it takes place at the detailed design stage of a development, and by its very nature it is difficult to consider bad practice within this context; this subsection will thus focus on good practice within the Australian city of Melbourne, which has suffered a series of floods and storm events throughout its modern history.

The River Yarra, which runs through the heart of the Melbourne regularly floods a number of neighbourhoods, whilst the city has also suffered severe flash floods in 2010 and 2011. In response to these events, city authorities commissioned a detailed water systems analysis that identified how the vulnerabilities to fluvial flooding were exacerbated by deforestation, whilst flash events stem from the cities increasing built up and impermeable form. Rather than adopting conventional flood mitigation and piped drainage measures, the city has identified WSUD (water sensitive urban design) as the most appropriate response to these vulnerabilities. In practice this means incorporating green infrastructure and measures to limit run-off

into all urban developments, as well as ongoing management and maintenance options; this city-wide adaption will prevent and control both river and flash flood events, now and in a future where climate change is increasingly significant.

The Melbourne example illustrates the value of adaptive measures and thinking. Having identified that a more conventional approach of expanding piped drainage systems was maladaptive, would likely have been more costly and not as effective, the innovative WSUD approach has provided co-benefits, including reduction of urban heat problems and drought (Brown and Clarke, 2007).

These examples demonstrate the importance of appropriate timing and scale to risk management. It can be concluded that it is the role of local planning and associated urban governance instructions to horizon scan and identify potential threats, hazards, vulnerabilities or exposures. Subsequently, during the process of development, design and construction, risks specific to the design or development should be evaluated and assessed, with corresponding risk reduction measures implemented accordingly. Risk reduction is continued within the management phase, whilst Governance and planning are also responsible for taking an overview of this process, maintaining stakeholder engagement and identifying new threats and vulnerabilities.

However, it is often emphasised that risk reduction needs to be proportionate, in particular not incurring excessive costs or disruption (Coaffee and O'Hare, 2008).

6.5 CONCLUSIONS

The findings of this chapter illustrate the complex causes of urban incidents, involving interactions between their unique contexts, social and technical considerations, degrees of exposure, potential hazard vulnerabilities and the appropriateness of new developments and land-uses. Accordingly, enhancing the resilience of the urban environment requires that all of these factors are addressed collectively.

The many interactions and involvements between different actors and stakeholders make it particularly suitable for consideration within the collaborative process of urban design. Perhaps more critically, it also highlights the necessity for governance arrangements that provide a framework for integration, learning and change.

The identification of design weaknesses, which emerged from the incident analysis, demonstrated common failings and lessons for practice. The links between the different weaknesses and event types could also be used to indicate where resilience action is necessary. Notably, it was often not clear whether the origins of a weakness lay with designers or the planning process that had enabled it; perhaps reflecting the artificial separation of these practices described in Chapter 2. These weaknesses and resulting lessons will be tested in later chapters against the governance and design practices of Nottingham, UK.

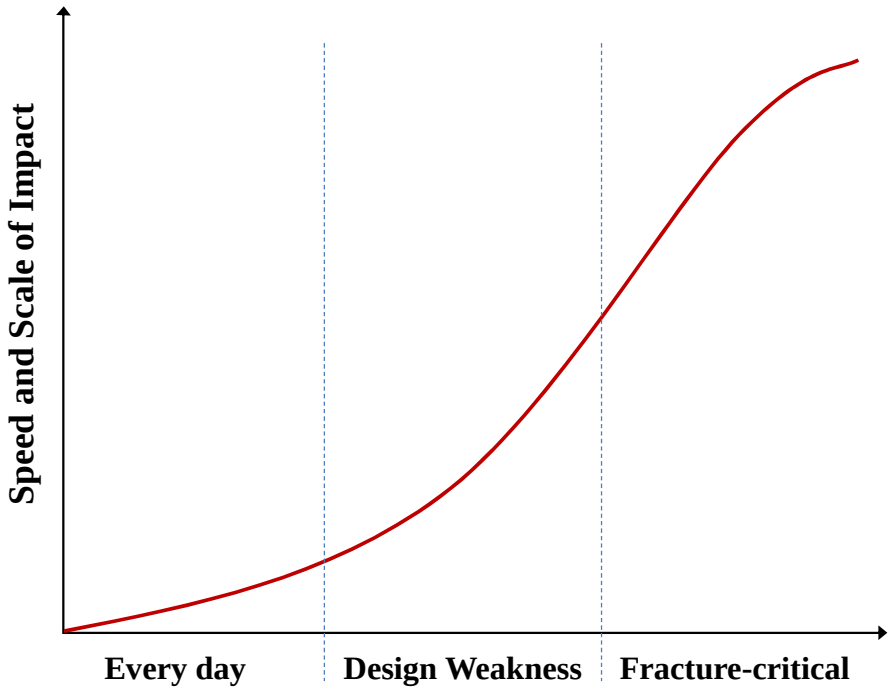
More generally, many of the design weaknesses could be better classified as forms of maladaptation (UN-HABITAT, 2011; Barnett and O'Neill, 2010; Supkoff, 2012); often involving inappropriate land-uses or development forms, overlooking

underlying vulnerabilities or failing to change in response to a dynamic context or changing circumstances. Literature reviews repeatedly highlighted that the design and governance of the built environment should be viewed as a continual process, rather than a one off action. Too often maladaptations occurred when this process stalled and was fixed at a particular point; potentially diminishing the resilience of the space.

Chapter 4 outlined that the appropriate response to maladaptation, as well as enhancing wider resilience, is to build adaptive capacity. Accordingly, urban systems which are best able to adapt to new circumstances, vulnerabilities and hazards, will be the most resilient; although as Galderisi & Ferrara, (2012) note, adaptive capacity is not just about an ability to change, but also about contextual appropriateness. Furthermore, adaptive capacity is not just the degree to which a physical space can accommodate new uses; from a governance perspective it can also mean changing current practices and institutional arrangements. However, as Chapter 4 highlighted, enacting change in large organisations, such as local authorities, can be difficult. Accordingly, how local institutions respond to vulnerabilities and their ability to change in response to new considerations will be explored further in Chapter 7.

It was also notable that the design weaknesses, and thus also the maladaptations, demonstrated different speed and scales. Thus, Figure 6.12, below, illustrates how maladaptive design can encapsulate a range of impacts from the systemic catastrophes of fracture-critical design, which often emerge during so-called ‘shock events’, through design weaknesses, to a more every-day, sub-optimal design that emerges as a result of ‘slow burn’ issues such as climate change.

Table 6.12 – Forms of Maladaptive Design



(Source: Authors own)

Examples of every day maladaptations would be excessive use of hard surfacing which both increases surface water run-off, but also amplifies urban heat island effect. Appropriately, these are two issues which the adaptive approach of Melbourne's WSUD, helped to address. In the example of the Carlisle floods, these everyday maladaptations eventually contributed to a much more serious event,

The analysis of incidents also highlighted the critical importance of understanding different roles, responsibilities and particularly timings; supporting Bosher's (2014) contention that these issues hampered the implementation of resilience initiatives within the built environment. By ensuring that there is integration of development and risk assessment stages, it means that those with the appropriate responsibilities

are involved at the right time, and that the accompanying design weaknesses can be eliminated.

It is thus proposed that risk management phases should follow an ongoing cycle, similar in nature to the 'social resilience cycle', presented in Chapter 4. Figure 6.13 shows a potential model of how these different processes can work together.

Figure 6.13 – Development and Risk Management Cycle

(Source: Author's own)

In order to evaluate how the weaknesses, models and practices proposed within this chapter are being enacted and engaged in practice, will involve the assessment of a Nottingham case study; initially evaluating the governance processes (Chapter 7), stakeholder involvements and ongoing management of spaces, before looking in greater detail at design vignettes (Chapter 8).

7 NOTTINGHAM GOVERNANCE CHALLENGES

7.1 INTRODUCTION

A literature review of urban governance, contained within Chapter 3, identified how governance is dually understood as both a decision making process for managing communal affairs (Healey, 1997), and as a more specific method of governing through a wider range of agencies and stakeholders (Kjaer, 2009). Rydin (2010) elaborated on this, suggesting that governance, as we currently understand it, is a policy framework which operates through networks; thus, if we wish to understand the governance surrounding urban design and resilience, it is important to understand the relational networks involved, from the perspectives of different stakeholders, including their roles, responsibilities, scales and timings of key decisions.

In the context of this study, governance has increasingly been identified as both the key medium for urban resilience, as well as a critical tool in enhancing wider resilience through 'joined-up' approaches (UNISDR, 2012; Coaffee, 2013a, 2013b; Wilkinson, 2011; Chandler, 2014; Zolli and Healey, 2013). Furthermore, local governance and decision making arrangements form a 'second-order' of urban design (Adams and Tiesdell, 2011), whilst urban design also has broader significance as a 'transdisciplinary space' and as an ongoing 'socio-spatial' process (Waldheim, 2008; Madanipour, 1996). Thus as governance is a policy and practice driven topic, which is often manifest through informal process in addition to the formal institutions of government (Healey, 2002), it is most appropriately explored through a case study of practice (Yin, 2014).

The previous empirical chapter outlined how resilience enhancement was contingent upon addressing potential weaknesses within all stages and scales of the development cycle; from design and construction, to planning and governance, as well as the ongoing management.

Accordingly, this chapter will examine a case study of Greater Nottingham as a means to understand the issues unique to the city, but also to draw out some wider issues for practice, such as the dominant governance discourse of 'entrepreneurialism' (Harvey, 1989), the inherent difficulties and tensions of integration and partnership (Newman, 2001) and the key role of maladaptation in diminishing resilience (Barnett and O'Neill 2010; Supkoff, 2012). This will initially involve the identification of the city's key risks, actors and agencies from the perspective of key stakeholders, before attempting to understand how these factors coalesce; in particular, how local risks are collectively addressed (or not), including tensions, opportunities and constraints, explored through the focus of urban design. It is argued that an understanding of this local risk landscape can be used to identify where resilience enhancement measures should be directed. The chapter will also reflect upon contemporary concerns, including austerity, rescaling, state retrenchment and the ability to tackle 'wicked' problems in a cohesive manner.

In particular, this chapter will consider the effectiveness of governance structures for planning and resilience, including the implications of National Planning Policy Framework (NPPF) and Civil Contingencies Act (CCA) policies, in promoting resilience and urban design; further questioning whether there is effective policy integration between these areas. As Hughes and Picentl (2012, p.20) have suggested, cross-

sector collaboration is contingent on the "*existing institutional landscape*", and thus examination of these roles, responsibilities, timing and appropriates scales of intervention, will further illuminate the wider governance implications, so critical for the enhancement of urban resilience.

Accordingly a number of key questions emerge for consideration within this chapter:

> How do different stakeholders understand resilience and engage with resilience practice?
>
> What are the practices of risk management amongst stakeholders? Further, what are their attitudes towards risk, the sophistication of approaches and how does this inform resilience practice?
>
> Is there evidence of local collaboration and partnership between stakeholders, professions and institutions?
>
> How does the development process address the local context and voice of citizens?
>
> How are the contemporary concerns of austerity, rescaling and reorganising planning impacting upon the practices of urban design and resilience?
>
> How capable are local stakeholders of accommodating and managing change? Further, what is the adaptive capacity of stakeholders and the institutional capacity of organisations?

> Is local decision making holistic or does it still consider issues in professional or institutional siloes? Is there integration amongst local governance institutions, both vertical and horizontal?

Notably, these issues mirror many of the concepts that were published as "The new Spatial Planning" by Haughton et al. (2010), and which saw 'Spatial Planning' as the continuous remaking of planning, the construction of 'soft spaces' which utilise more informal and creative alternatives to formal planning, fuzzy boundaries which cross traditional geographic delineations and a general push to make planning more responsive and adaptable.[95]

Together these factors will present a picture of how stakeholders currently work together to promote concepts of resilience within the planning, design and management of urban spaces, and the degree of integration within policy frameworks and more informal networks. To further understand these themes, stakeholders have been broadly grouped according to their roles and organisation responsibilities, within this process, and these groupings form the main sections of this chapter.

Whilst each section is based on material gained from interviews with stakeholders from that group, of which there is some overlap, reflections from other stakeholders on a particular group, is also drawn upon to further illuminate their significance. The stakeholder groups are:

- Designers and Other Built Environment Professionals

[95] Examinations of collaborative planning and the wider push for more holistic forms of governance, emphasise the challenges and complexities of realising them successfully in practice (Tewdwr-Jones, 2013; 6, et al. 1997).

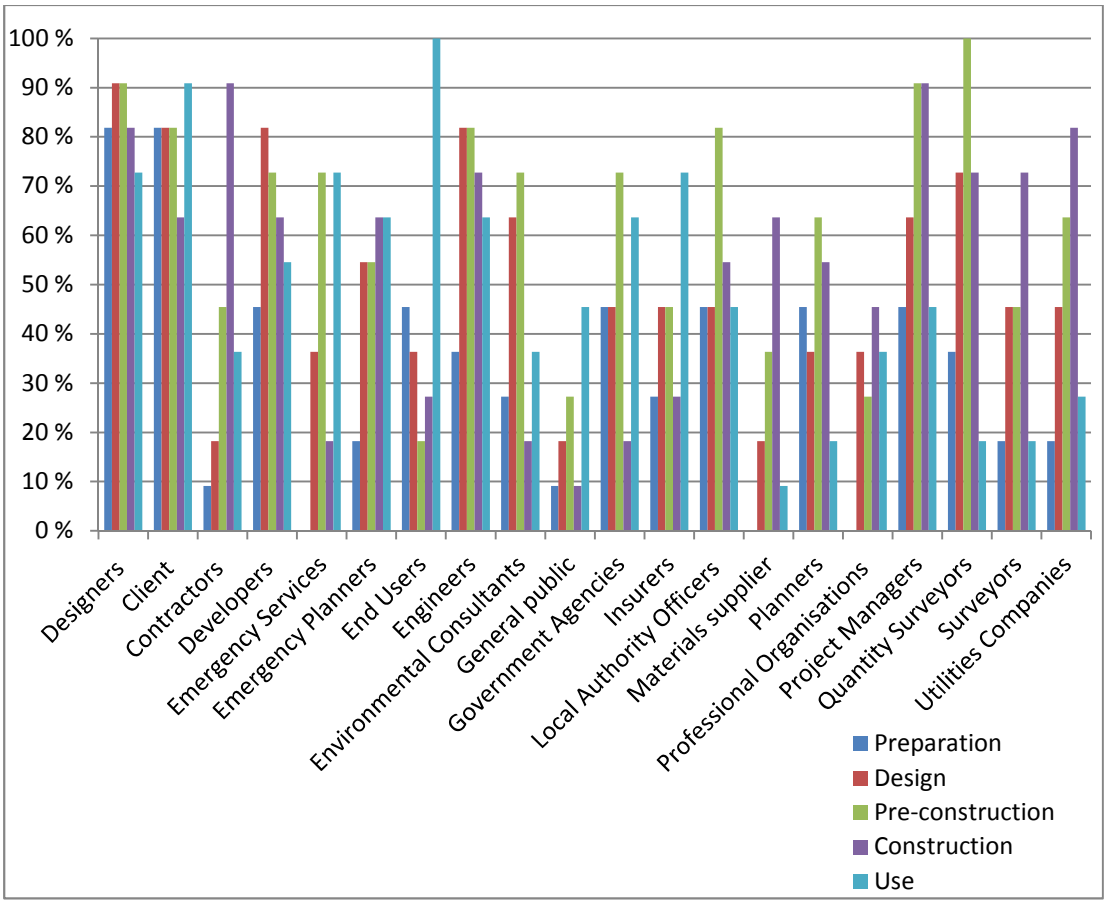
- Developers
- Local Authority
- LRF and Emergency services
- Environment Agency and Utilities

However, as a starting point to this work, an examination of which stakeholders were currently involved in development and their temporal associations, identified as a key issue for resilience implementation (Bosher, 2014), was explored through an online survey.

7.2 STAKEHOLDER INVOLVEMENT ANALYSIS

The online survey of resilience and built environment stakeholders within Nottingham and Nottinghamshire was used to provide a baseline for governance analysis and to establish the temporal involvement of different stakeholders within the processes of resilience and urban design. The details of how this was conducted are described in Chapter 5. Figure 7.1, below, shows a summary of when the responders believed that stakeholders were currently involved in the development process.

Figure 7.1 – Stakeholders Currently Involved with Development and Risk Management



(Source: Author's research data)

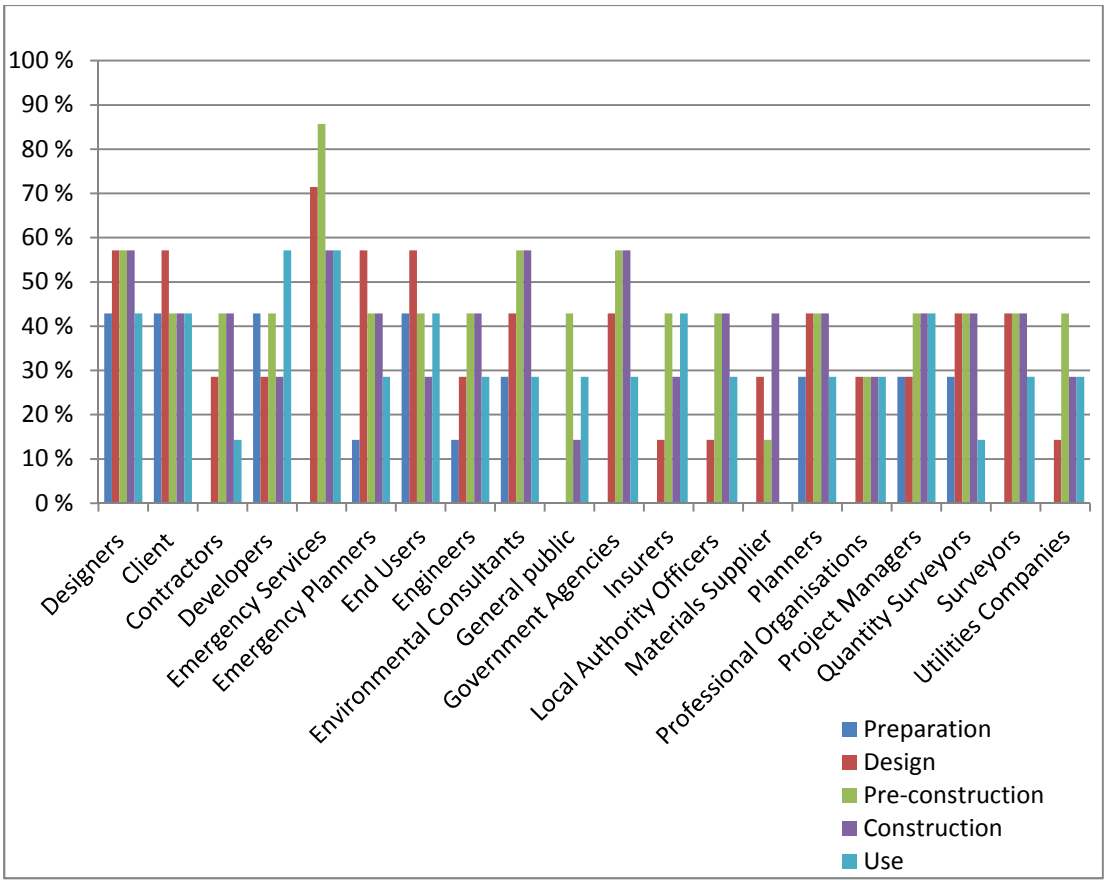
As would be expected, built environment professionals such as architects and clients, were all perceived to have a consistently significant role throughout the development process. Perhaps more surprisingly, all of the 20 proposed stakeholders were adjudged to have some degree of involvement, reinforcing the complexity of roles involved within the development process.[96]

[96] Only two respondents further suggested that other stakeholders should have been included in the survey, in this case Construction Design Management (CDM) co-ordinators.

Given the relatively small size of the sample, it is perhaps unwise to read too much significance into these results. Similarly, and in retrospect, the questions asked within the survey are quite complicated and constituted a number of different aspects to consider within the one response; so not only who and when stakeholders were involved, but also the more nuanced point of whether they were actively involved in the process of risk management and reduction. Given that a literature review indicated that many stakeholders were not currently engaged with the risk management agenda (Coaffee and Bosher, 2007), it seems probable that responders were answering on the point of wider stakeholder involvement, rather than being actively involved with risk management.

Surprisingly, emergency/risk managers were deemed to be quite involved, but perhaps it had been assumed to mean CDM professionals, which as Chapter 4 outlined are integral to most construction projects, although this largely relates to construction risks. It could also be questioned how much experience of the development process the LRF stakeholders actually have, given their later complaints about a lack of involvement. More significantly, the survey doesn't address how substantive the involvement of stakeholders is; i.e. were utilities involved with just the connection of new developments to water or power, or do they take part in wider discussions about the suitability of developments and the risks involved?

Figure 7.2 – Stakeholders who *Should* be Involved with Development and Risk Management



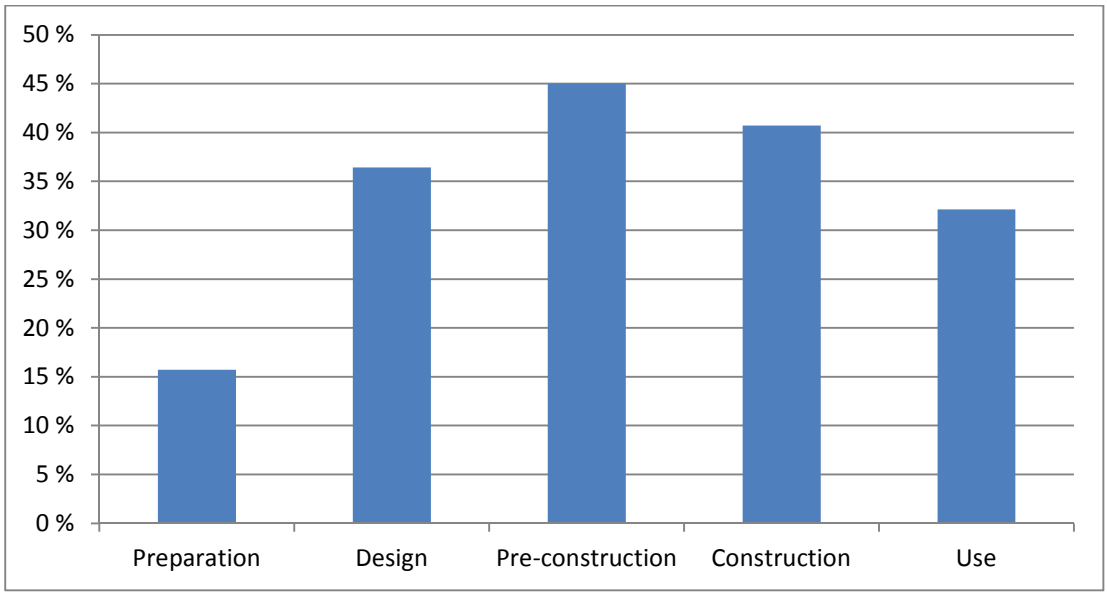
(Source: Author's research data)

The second part of the survey asked participants which stakeholders they felt *should* be involved in the risk management and development process. In contrast to the first section, there were many fewer completions of this second part; notably all LRF respondents completed, whereas only the built environment stakeholders provided limited responses. Whilst applying the earlier caveat of not investing too much significance in such a small sample, it would appear to indicate that the built environment stakeholders were less interested or engaged in this agenda.

More widely, and taking into account the bias by lack of completion, the survey indicated that fewer stakeholders *should* be involved, perhaps indicating that participants would like a more straightforward process. Notably, LRF participants overwhelming indicated that emergency services should be more involved, the built environment participants did not support this. It could be said that these responses highlight the tension between an easier, quicker process that involves fewer participants and a slower, more inclusive process that addresses all issues. Perhaps it also reflects a complacent attitude to risks from built environment stakeholders.

More specifically, pre-construction, which includes the making of planning applications, was identified by participants as the best place for wider stakeholder involvement, including emergency services stakeholders; see Figure 7.3, for full breakdown of when stakeholders should be involved in process of design and risk management.

Figure 7.3 – Breakdown of when stakeholders should be involved



(Source: Author's research data)

However, as Bosher et al. (2007a, 2007b) notes, the pre-construction phase is often too late for meaningful involvement, as many design issues will have been fixed. This perhaps reflects a culture that is not familiar with best practice in risk reduction.

These issues were further explored through stakeholder interviews, which also attempted to understand the context, motivations and substance of stakeholder involvement, as well as the degree of integration between organisations and professions. This integration was measured using Wilkinson and Applebee's (1999, p.7) definition of vertical integration as 'power and resources', and horizontal integration as 'durability, trust and loyalty' of relationships.

7.3 DESIGNERS AND OTHER BUILT ENVIRONMENT PROFESSIONALS

A variety of Nottingham and Nottinghamshire based architects, landscape architects, urban designers and planners were interviewed for this study, of whom the designers predominantly worked in the private sector, whilst the planners were employed in public sector roles, including local authorities, architecture centres and the HCA[97].

Notably, there were nuanced differences in their temporal involvement; planners would often take a role in assessing the early viability of a scheme, but would not be involved with the delivery and operation of a project once the planning process was completed. Some designers, particularly architects, would have a role in the preparation and appraisal for a site, but more commonly they would begin work at the design stage, once the brief and certain elements of a scheme had been fixed.

[97] The Homes and Communities Agency (HCA) is the national housing and regeneration delivery agency for the UK, working to develop government owned land and promote development.

The landscape architect DS, suggested that they tried wherever possible to challenge assumptions of a brief, for instance when positions of buildings had been located with little initial thought, but became fixed as the project progressed; however, this was not always appreciated by clients. A number of participants noted how the shift from traditional forms of contract to design and build, where in effect the construction contractor employs and directs the design team, had distanced designers from key decisions within a development.[98]

Amongst all participants, many of the designers displayed the most nuanced understanding of resilience, with some making connections to ideas of shock events and adaptation. Architect JM, suggested that by making their buildings more adaptable for climate change, they were building resilience. More broadly, respondents often equated resilience with being long-lasting or robust, particularly within the context that much current development is short-term focussed, lacking in quality or consideration of wider issues. Designers' responses were more often shaped by their own experience, but many made a connection between resilience and sustainability, which was typically central to their work. Accordingly, they provided some interesting definitions of resilience:

> *"…the capability to adapt to change and sustain in a way that still performs to an optimum standard."* (JM)
>
> *"…sustainability with a bumpy ride."* (DT)

[98] In an interesting twist on the shifting roles within the development process, the architect AR talked about how they are now marketing speculative developments to finance organisations, as a means to cut out traditional developers and improve the quality of schemes.

Less positively, one local authority urban designer never appeared convinced of any connection between urban design and resilience, or that it was relevant to his work. Whilst some of the planners interviewed were able to articulate a working understanding of resilience, they were often more tentative in their responses and revealed an economic focus, as this response highlights.

> *"For me resilience is about buildings and places lasting beyond a generation or two… the best places are those where you can sell a house easily."*

Perhaps crucially, few participants identified resilience being a term that was central to their work, whilst few still demonstrated awareness of resilience policies and obligations, such as CCA or the new responsibilities for resilience found in the NPPF (see Chapter 1 for quote). As the literature review indicated, urban development is still primarily shaped by economic factors, with issues of resilience coming some way down stakeholders' list of priorities.

In evidence of this, participants were asked to identify the greatest risks to developments in the Nottingham area; whilst this question primarily aimed to identify the most significant natural hazards or man-made risks, it was asked in a fairly loose way, to avoid leading respondents to a particular conclusion. Almost universally, the interviewees identified financial issues, problems with the economic market and achieving viability, as their primary risk. This was expanded by DT who suggested that you had to consider the social consequences of the current downturn, whilst DS described how recent stalling projects had made it very difficult to plan workloads and manage staffing.

Once again, the planners showed a greater economic slant to their responses, with one noting how the economic situation threatened the viability of Nottingham's 'shopping core'. Another suggested that local politics itself was a risk, both in terms of what local politicians would do to encourage growth or simply poor decision making associated with development.

The architect JM provided a more considered response, suggesting that flooding was currently the greatest risk, but that in years to come climate change would mean that overheating would be a greater problem. Overall, flooding was identified as the most significant hazard in Nottingham by participants, with some further discussion of crime and crowd management issues[99].

Whilst it was apparent that designers did carry out some basic risk management as part of their day to day work, responses showed little enthusiasm for the topic; on the specific issue of flooding, flood zones were typically used as clear cut rules for where developments could or couldn't go. Outside of economic considerations, it was apparent that risk management did not form part of the planners work. Following the review of incidents in the previous chapter, it was suggested that planners should identify potential vulnerabilities and the broad suitability of proposals, whilst designers should actively manage the risk of a given development; in practice neither appeared to be the case.

All participants agreed that they had a duty to end users and the general public, by providing design that would be appreciated and enjoyed. However, there was also

[99] When quizzed about whether they considered terrorism to be a risk in Nottingham, designers and planners responses were divided between those that had never considered it an issue, and those incredulous that it was even being suggested.

consensus that meaningful engagement with both end-users and the general public was rarely done and that important local or contextual knowledge was often missed; several participants suggested that operator feedback, could optimise the performance for both SuDS systems as well as sustainable building technologies, reinforcing Carmona's (2014) point about urban design being understood as an ongoing process. More widely, the timing of any engagement was identified as particularly important to good consultation, but a paradox emerged about when to do this; too early and there wouldn't be enough information to engage a non-technical stakeholder, too late and the design would be fixed, although most likely it would be easier to understand; perhaps reflecting a difficulty with engaging non-built environment stakeholders, such as the emergency services (Coaffee and Bosher, 2007).

Similarly, many stakeholders also noted that a responsibility to the environment and sustainability was important to them, but that the duty to clients and thus cost, was their ultimate responsibility. Accordingly, a number of the designers suggested that they did try to work with clients who shared their values, going further to say they wouldn't work with certain sorts of clients, most notably volume house-builders.

When asked about the results of the survey, which suggested that architects and designers were identified as most responsible for risk management, there were varied responses; NE suggested that this was probably the case, *"on the basis that no-one else will,"* whilst DT echoed the findings of the previous empiric chapter, suggesting that different scales of operation held different responsibilities:

> *"It's planning that's there to see the bigger picture"*

Whilst many participants noted the problem of "silo working", DS suggested that what was needed was a "*transdiciplinary approach";* suggesting that contemporary problems do not sit within one professional jurisdiction and thus collaboration was essential to ensure good outcomes. He also highlighted the danger of *"reductionism"*, where problems are addressed by giving a new position sole responsibility and issue; citing how the employment of a sustainability expert, effectively reduced the activity to a *"tick-boxing exercise".* These comments aligned almost perfectly with the findings of Chapter 3, which described how the complexities of contemporary problems require holistic forms of governance (Giddens, 2002; Healey, 2007; 6, et al., 1999; Wilkinson and Appelbee, 1999; Newman, 2001); critically demonstrating that some stakeholders are ready to accept this model.

Reflecting on the barriers to more integrative working, it was suggested that professional institutes are quite apathetic to cross-disciplinary working, as there is a perception that it is erodes their core services. Many other respondents identified highway and drainage engineers as particularly unwilling to change or work with others; notably these are predominantly public sector roles, perhaps reflecting issues of 'institutional inertia', as highlighted within Chapter 4. Participants noted other barriers to collaborative work, particularly surrounding who was ultimately responsible for a design and if it went wrong whose insurance would pick up the bill, but that the practice also represented more opportunities for innovation. Education was suggested by a number of participants as the only way to overcome this resistance.

When prompted to consider their engagement with other stakeholders, the designers provided varied responses. All had come into contact with the Environment Agency when dealing with flooding issues; some were positive, but others displayed resentment and frustration. AR exemplified this frustrated perspective, suggesting that the area around flooding was "over legislated" and that the EA were "proscriptive" and too "black and white". However, this was countered by DS who suggested that on the implementation of SUDS features, the EA were helpful, and that it was local authorities who created difficulties and confusion. Many responses gave the impression that they did not understand the technical aspects of flooding that the EA administer.

Designers were almost universally wary of engaging further with the emergency services or emergency managers, often citing anecdotes where it had been problematic. NE talked about the difficulties he'd encountered with fire officers giving *"bad advice"*, or exercising *"power without responsibility";* reflecting a lack of trust and common ground between approaches; perhaps whilst designers wanted other stakeholders to come out of their silos, they were themselves unwilling to come out of their own. This is disappointing, as engagement between these stakeholders could provide a non-material way of enhancing resilience.

By contrast, the planners were much more accepting of professional co-operation in general and offered few strong views on other stakeholders. However, a number suggested that design review, where developments are assessed by a panel of experts from different professional backgrounds, was a way to promote more

holistic thinking. In effect, design review panels function as a 'soft space' (Haughton, et al., 2010) for more informal consideration.

Perhaps unsurprisingly, it was the topic of urban design that provoked most discussion and was uniformly agreed to be of critical importance, too often overlooked and too narrow in its focus, as Chapter 2 suggested. Listed below are quotations by AJ and DT, illustrating this point:

> *"Urban design is the thing that is missing from many developments in Britain… urban design is about creating whole places rather than individual buildings, it's about society and community rather than individualism, it's about people, sociability.*

> *"It's the thing that makes places work. It's bigger picture design in the built environment. Considering issues at a number of levels…"*

Notably, the planners interviewed were rather tentative about discussing urban design in any depth, with several suggesting *"you'd need to speak to an urban designer about that."* This seemed to echo Punter's (2007) argument about the lack of design skills amongst planners (Chapter 2), particularly within local authorities, and was further corroborated by designers including LA who stated that, *"there is an overload of guidance and not enough people to interpret it properly",* and that guidance was there as a *"palliative for a lack of skills."* This summed up the rather disparaging comments about urban design guidance in general. Whilst several participants made positive comments about Manual for Streets, highway guidance came in for particular criticism, with DT suggesting *"bad highway guidance stops*

even reasonably good design." Building on this issue, several participants noted how technical and quantitative factors, as exemplified within highway engineering or financial issues, were often given greater weight in decision making.

Importantly, one respondent made it very clear that they believed that urban design was the key medium to address issues of resilience, whilst others suggested that SUDS and green infrastructure could be used to reduce incidents of flooding. Participants also proposed that exemplars and publicising good practice were all important, whilst reviews of bad practice (as in Chapter 6) could also have a role. One interesting contemporary concern raised by an interviewee, was the phasing out of Design & Access Statements with smaller planning applications, which he felt were a key tool for articulating understanding of a design and could be a similarly important tool for resilience issues. The UK Government appear to be moving away from proscription, but many stakeholders felt this was the only way to ensure compliance. This begs the question of whether a 'resilience statement', should be a mandatory part of planning applications?

The final focus for this group of stakeholders was adaptive capacity, institutional thickness and contemporary concerns. In many ways the designers interviewed showed the greatest adaptive capacity of all stakeholders, being generally well informed and particularly receptive to new ideas. Less positively, designers were often ignorant or blasé of local risks and hazards, as well as the accompanying institutional framework. But adaptive capacity is also contextual; many designers complained about being passed over for work within the city, with the Council preferring to deal with big named practices from outside the area. By comparison,

the planners interviewed were more inward focussed on planning protocols and economic issues; hinting at the wider loss of 'vision' that Tewdwr-Jones (2013) described. However, the local organisations involving planners, such as the regional architecture centre, help to provide greater intuitional thickness and support for wider changes in practices.

7.4 DEVELOPERS

A number of Nottingham-based developer stakeholders were interviewed for the study; one working in the public sector for the HCA, as a commercial agent for private developers in Nottingham (TG), whilst the final participant was the head of an exemplar developer, formed from a public/private sector partnership between the HCA and a private investment fund, utilising pensions and insurance (BP).

All of the developer stakeholders interviewed shared similar temporal and scalar involvements, being primarily involved with the initial appraisal, consideration of viability and eventually the appointment of consultants. Of them, only BP maintained a long term interest in the ongoing use of a development, which they acknowledged was atypical; *"most developers are not long-term investors*".

The commercial agent TG, a surveyor by profession, suggested that agents and developers *"framed*" the work of architects and designers by producing briefs and appraisals that stipulated the most commercially appropriate uses, including the amount of floorspace, volume or even form of a building, that were required by "the market". This appears to substantiate comments made by a designer, that early design briefs and appraisals are often *"only about the finances",* and neglect wider

considerations. Developers clearly play a critical role in determining the content of urban development.

The interviewees showed great variety in how they understood resilience. As with designers, resilience was often taken to mean the durability or sustainability of a development, albeit with some consideration of contingencies. However, some of the most interesting reflections were made by TG, who suggested that he saw resilience as:

> *"About flexibility... The ability to be resilient within the market, the ability to change … It has to be something that if times change we can alter it or amend it, or if we need to get out of it and sell it in the open market."*

In some respects this is close to the adaptive capacity, identified as being key to wider resilience in Chapter 4, but it once again reinforces the economic primacy of urban development. Furthermore, he provided a number of anecdotes, describing how the ability to be adaptable, rather than being overly costly or indeed bespoke, was the most commercially desirable parameter. This resonates with a rather derogatory comment made by a designer, that:

> *"A developer is someone, who in our experience, wants to build something for as cheap as they can and sell it for as much as they can, and as a result if they have a choice between materials that will last 20 years or 100 years, they will use the 20 year material."*

These reflections begin to unpack the interlocking considerations of risks, duties and priorities held by developers. Once again, there was a strong consensus that the

most significant risks to developments in Nottingham were financial, including viability and the availability of funding. TG suggests that there is a second aspect to this financial risk:

> *"…if you're acquiring sites, the complexities around acquisition; legal risks of have you got clean title, are there restrictions, does it have an underlying issue about you can only use it for X?"*

What becomes apparent through these interviews is how development is a financially risky activity. As one participant noted, *the "construction industry builds prototypes again and again and again."* Developers therefore seek to mitigate this financial risk through the control of costs. Worryingly, AR went further to suggest that developers, particularly in the house-building sector, were actively hiding other forms of risk, such as potential flood risk, to avoid the cost of mitigation or putting off potential buyers. This comment was substantiated by stakeholders from the emergency services, who also argued that developers were unwilling to commit funds for additional safety features.

As part of their work on sustainability, BP use a risk matrix to categorise potential risks to a development, including social, political, weather and more specific issues such as flooding, which is intrinsic to their board approval for securing finance. By contrast, they argued that Government policy was moving away from this approach, towards one of *"just build bloody houses!"* Worse, that sustainability and design quality have been *"all but abandoned"* in favour of a very short-term focus, which mirrors the private sector where costs have always been the *"sole priority."*

When asked to reflect on whether they consider natural hazards or man-made threats, the development stakeholders provided a range of responses. AB of the HCA acknowledged that flooding is a key issue in development, and one that the industry has been *"foolhardy*" about in the past, but suggested that in their work they have passed decisions and responsibility to the local authority. However, the most interesting response is from TG, who clearly did not view these as significant in comparison to the financial risks:

> *"OK physical risks of site, but they tend to be ground conditions. In general terms they are much more manageable than legal or funding risks, and they tend to come much further down the line."*

Referring specifically to flooding, he further suggested that he was *"not certain it would be high on our risk register, architects will maybe have to design undercroft parking or whatever."* In effect, he suggests that whilst developers and their agents are actively managing a range of risks, they do not take physical risks seriously, rather they 'rescale' risks such as flooding to designers and the eventual end users. Reflecting on why this is the case, one of the designers interviewed suggested that it was an attempt to reduce "opportunity costs"; in effect, the large, unsecured costs incurred by developers during the early preparation phase of a development, which could not be recovered.

In contrast to this approach, both BP and HCA suggested that responsibility for the natural hazards and man-made threats should be dealt with by an integrated design team. Both had experience of working with the Police on developments, and neither were particularly positive about further work with the emergency services;

suggesting that Police advice on security was “siloed” and often worked against other design objectives, such as the need to be “permeable” and integrated within their surroundings, i.e. not a gated development.

Critically, BP also had problems when an exemplar housing scheme they were proposing, Green Street, was jeopardised when the EA insisted the development was raised up to address flooding problems (this example is addressed further in Chapter 8). The HCA suggested that with the loss of regional government, there was no longer the coordination between themselves and the EA, which had happened in the past. TG had the least engagement with wider stakeholders, but made some interesting points about planning more widely:

> *“I do get involved with planning, but planning’s got a lot easier... If you have a logical scheme that is not contentious, then you’re going to get planning… In Nottingham City there is a realisation that they have to help.”*

This begs the question of how, if permission for certain developments is assured, standards surrounding design and resilience issues can be upheld?

BP were keen to point out that good urban design was at the very heart of all their work, but were highly critical of the low quality of urban design from most commercial developers, compounded by the lack of scrutiny and urban design understanding from planning authorities; further suggesting that the increasing lack of flexibility and tendency to do things by the book, was a consequence of downsized and stretched planning teams.

BP were also critical of urban design guidance and were strongly opposed to the introduction of standards, explaining how BREEAM[100] sustainability standards had *"dumbed down"* and limited what ambitious developers could achieve. They suggested that showing local authorities examples of good practice was potentially helpful, whilst they also advocated design review as the means to overcome poor design.

Whilst the HCA no longer prioritise design as it once did, they do promote design review to their partners. More generally, AB commented on the standard of urban design presented by the major housing developers:

> *"I sometimes get very disappointed by what developers show me. It's pretty poor really."*

These comments echo the consensus amongst designers interviewed that the private sector is not really delivering good urban design, particularly in residential developments. In partial explanation of these issues, SG used the example of green buildings to illustrate the developer's rationale:

> *"The industry has to tick some boxes... the developer pays for all this stuff, but doesn't benefit, so the developer is looking to cut as much out, whilst satisfying regulations."*

Whilst private-sector developers are responsible for delivering most of our built environment, this research suggests that it is based on a model of minimum spend,

[100] Building Research Establishment Environmental Assessment Methodology (BREAM) is a standard for sustainability assessment. Increasingly achieving a certain BREEAM standard has been a condition of planning for certain developments.

with little consideration for end-users. However, when we consider the work of developers from the perspective of adaptive capacity and institutional thickness, there are deeper problems.

This appraisal of development represents something of a paradox; whilst based upon assessments of economic risk, their focus is very short-term and solely driven by past financial models, as SG outlines:

> *"My industry is one of the worst for everything I do looks back, very little of what I do looks forward; so if I do a valuation I look at historical data, deals that have happened, not looking at whether the building has a long term future.. We don't make a market, we take a market."*

This poses a number of questions, including how can the existing market be challenged, and how can this model encompass change and look to the future? This also explains why maladaptive approaches can be perpetuated by market economics.

It was again suggested that Government policy was needed to force developers into tackling hazards and ensuring greater design quality. AR suggested that making clients and developers liable for risks and hazards, as had happened for CDM, was one way to make this work and that voluntary enforcement was ineffective. However, AB highlighted that the existing administration was unlikely to enforce any measures that would slow the supply of housing:

"The focus that we've got today is a bit different, because today what the Government is looking for is results. It's not looking for lengthy, drawn out processes that are going to stop things or hold things up."

BP suggested that financial innovation was also needed; highlighting how delayed land purchase, whereby a developer pays back more in the future when the development is a success, would allow developers to spend more on opportunity costs (including design) and think in a more long term way; however, they suggest there is a "systemic" culture against innovation in public bodies. Citing an ongoing development in Nottingham which they were hoping to make 'custom build', in effect giving the end-user much greater say over the eventual form whilst reducing the *"equity risk"* for the developer; this was overruled by the HCA as it didn't fit with their forms of contract.

The review of this group of stakeholders indicates that they have the critical influence over the key early stages of development, but their capacity to change from what are often maladaptive practices, is constrained by locked-in financial systems. Certainly, there is a role for better local authority guidance in this area, but perhaps the solution comes from involving funders and insurers. In particular, several participants noted that developers are ultimately answerable to their investors, such as pension funds, and if these are more demanding of resilience and design issues, developers will have to change their ways.

7.5 LOCAL AUTHORITY

From the perspective of this study, local authorities are the key stakeholder; being the location of critical, local decision-making institutions and wider resources relating to resilience and design.

As outlined in Chapter 5, the administration of Nottingham is relatively complicated; Nottingham City Council is a unitary authority surrounded by a number of Borough Councils who are part of a two-tier authority with Nottinghamshire County Council. As one officer commented, the city is effectively *"land locked"* with its administrative boundaries closely following the settlement boundary of the city, and the River Trent to the south. The land immediately south of the Trent, but still within the boundary of what the ONS define as the 'Nottingham Urban Area', is administrated by Rushcliffe Borough Council, with Nottinghamshire County Council providing upper-tier services.[101] Accordingly, this study concentrates on these authorities.

Within this structure, there are broadly three areas of local government practice that emerge as particularly relevant to this study: emergency planning[102], planning[103] and flood management[104]; all of which have distinct roles and involvements within the development process.

[101] In a unitary authority, such as Nottingham City, all these powers are held within the one authority, whereas within the two-tier system, RBC have responsibility for development planning, but the County Council oversee upper-level issues, such as flooding and highways.

[102] Emergency planners work on the preparation of plans to deal with emergency events, as well as communicating this work to stakeholders. Their critical involvement could be defined as during the use phase of development, and as this section will further explore, they have little involvement in development planning and design.

[103] Planners make the policy which the early stages of development respond to and advise on planning permission through development control, but have a limited role beyond this stage.

[104] The work of flood managers has certain parallels to the work of emergency planners, being tasked with managing and communicating flood risk with end users, but encompasses more pro-active

A number of local authority officers from within the study area were interviewed, as well as several former officers. This consisted of two Emergency Planning Officers (JS & PS), the Flood Risk Manager (FB) and the Head of Development Management and Regeneration (AG), from Nottingham City Council, and another Emergency Planning Officer from Rushcliffe Borough Council/Nottinghamshire County Council. Two former officers from Nottingham City Council were also interviewed, including the previous head of planning (AJ).

All interviewees showed a degree of engagement with the topic of resilience, although there was some variation about what that meant. AJ suggested that from a planning perspective it was about *"dealing with changing circumstances",* before noting that the planning system often struggles to think ahead. AG had a slightly different take:

> *"I think resilience is built in to what we are trying to achieve, that's what the planning system is about. It's about creating robust environments."*

Whilst there was further talk about the critical importance of social issues, balanced communities, avoiding *"environmental collapse"* and the complexities of their work, there appeared to be some complacency over long-term thinking and work to enhance resilience. FB used an example to illustrate her definition of resilience, suggesting that a flood resilient house would be one that floods, "*but can quickly get back on its feet."* This pragmatic understanding reflects the way that flood managers

proposals to reduce flood risk, rather than relying on emergency response procedures alone. Whilst they are increasingly having input into the planning of developments, the work of flood management is highly funding dependent.

are working practically to improve the outcomes of urban flooding through a variety of means.

The emergency planner's work was largely about emergency preparedness and consequently they were very aware that flooding was the most significant risk to developments in Nottingham. In particular, ES noted that the area had seen a major flood in 2007, four flood events in 2012, one in 2013 (at the time of interview) and that surface water presented the biggest risk; also noting how flooding can impact upon power and water supplies, and thus emergency plans are needed to safeguard vulnerable individuals, such as the elderly and infirm. In addition to their plans, the emergency planners also run training events and conduct outreach with other stakeholders, such as schools, to help them to prepare and respond to emergencies. There would seem to be an obvious opportunity to combine this outreach into the context of new development, where planners operate.

From the emergency preparedness perspective, they also appear to be integrating their work with other authorities; if for example, there is coastal flooding in Lincolnshire, there are coordinated plans to evacuate residents from there to Nottingham. However, as ES noted, there are limitations to their work:

> *"Prevention is better than managing it later down the line… We don't really do much prevention… we don't really have the expertise, and we don't really have the resources."*

When asked from a planning perspective about the biggest risk, to development in Nottingham, AG answered:

"It's all about risk. It's a risk about economic development, will it survive?"

AJ explained this economic concern by outlining the difficulty for a local planning authority when so much of what they want to achieve is in the hands of private developers and thus that they are beholden to them to deliver development. AG suggested that the priority of City planners in any new development is for an, *"economically, socially and physically thriving and robust piece of new city,"* again demonstrating the broad range of planners considerations, as well as the primacy of economics. However, AG was rather flippant about how significant other hazards were to them, suggesting that as an authority they were more concerned with *"social and economic disaster".* He was also quite sketchy about the authority's newfound responsibilities for flooding.

One of the wider themes that emerged from local authority stakeholders is how their responsibility has grown as a result of recent legislation, including the localism act and abolition of regional governance, such as the need to provide the evidence base for future housing allocations. As outlined within Chapter 4, top-tier authorities are now designated as Surface Water Lead Local Flood Authority (LLFA), under the 2010 Flood and Water management Act. As FB outlines it means that LA's now need to:

> "…*take the lead on investigating the causes of flooding, regardless of where it came from, producing strategies for reducing flooding, keeping a register of assets and features which prevent flooding."*

FB suggests that the LLFA produce these strategies and flood management proposals, so that:

> *"When funding opportunities come along we can say this one is suitable for that funding round."*

However, as this comment shows, any material work that flood managers wish to push forward is always dependent upon unpredictable, outside funding; in effect, vertical integration is constrained by resources (Wilkinson and Applebee, 1999). Once again, it is economic forces, rather than assessments of potential vulnerabilities or exposure, that is the driving force for action.

Flood managers are also able to comment on the flood implications of planning applications, but at present their powers are limited by delayed legislation; Schedule 3 of the Flood and Water Management Act allowed for the formation of SUDS Approval Bodies (SAB), which would both approve and have a responsibility to adopt and maintain SUDS features. It is unclear how much technical input flood officers have; ES noted that currently all water modelling was carried out on behalf of developers, and *"had to be taken at face value"*, as local authorities lacked the resource to calculate or check these issues.

When officers were asked about the results of the survey, including whether architects and designers should be responsible for risk reduction, there were some important points, most notably from AG:

"Architects work to the interests of the client, they're not necessarily there for the public good. I think resilience is about the public good and local authorities need to bring that agenda together."

In effect, AG has recognized planning's role in horizon scanning and identifying potential hazards and vulnerabilities, as contended within Chapter 6. ES recognised that designers had many considerations to deal with, so he suggested that emergency planners should act as "*someone to ask for advice and support, if needed*."

In terms of their engagement and integration, local authorities work with an extremely wide range of stakeholders. In particular, AG was keen to highlight how *"planning is more inclusive."* But paradoxically, planning stakeholders were amongst the most difficult to engage, as outlined within the methods chapter of this study. It is perhaps telling that an interview with a planning officer was only arranged following the intervention of the commercial agent. Whilst very knowledgeable, AG was a challenging interviewee, often defensive in his responses and appeared suspicious of the motives of the study. Other planning officers were similarly recalcitrant, whilst one voiced concern about the possible scrutiny of the study, perhaps reflecting the contestant criticism of planners by Government Ministers (Daily Telegraph, 2012).

Most interestingly, when emergency planners in Nottingham City were asked about their relationship with planners, they answered that, *"there is no real interaction between both groups."* Further, when they tried to make an introduction to the City's urban design team, perhaps in the hope that the study would foster some

connection, they received a *"snotty email"* from the head of urban design telling them not to bother them. This lack of integration between planners and emergency planners, echoes observations by Coaffee and Bosher (2008); demonstrating how the ongoing process of development and resilience building, are not considered holistically (6, et al., 1999).

This situation is slightly different within the County, where Rushcliffe Borough Council have an emergency planner seconded from the county council, and who is often consulted on flood issues. Despite this not being the core of his work, he advised planners on emergency access issues, as well as the suitability of certain developments within flood areas. FB suggested that the County had a longer history of dealing with flood issues, and that this perhaps explained their more *"joined up"* approach. However, conversely a developer stakeholder also noted that one of the difficulties of two-tier authorities was that you could get contradictory advice from different local government tiers (see Chapter 8), whilst it was further noted that the County also had a further tier of local governance to satisfy, with parish councils making the situation even more complex. These inconsistencies between authorities was also an issue for the implementation of urban design.

Certainly the cuts to planning staff and accompanying increase in workload that other stakeholders have observed, seem likely to have made this engagement more difficult. However, there does seem to be a certain cultural behaviour and detachment amongst local authority planners, particularly within large city authorities, which the urban designer DT commented on:

"You could call it arrogance if you like, because they think they know it all. But I think there is something in that, because to a certain extent they do!"

Discussing this with some other participants, it was suggested that there can be so many experts and so many people that you need to engage with within a local authority, that it can be hard to find the time to engage outside it; particularly within well financed city authorities. This could explain the reluctance of officers to engage with the study, but also reflect the institutional inertia' described by Coaffee and Healey (2003), or an element of 'group-think'. Moreover, it could make culture changing and thus more holistic governance, more difficult (Newman, 2001).

The City Council work closely with the EA around flooding issues, but there was acknowledgement that there has been a gap within this process; the City Council won't grant permission where there is a flood risk, but it is only the EA who build flood defences and they won't put protections in place ahead of developments. This 'chicken and egg problem' does underline the importance of LLFAs in tying together development and flood mitigation. At present, LA flood managers base plans on datasets for fluvial and pluvial (river and surface) flooding, on EA data. Nottingham's surface water management plan is currently being checked by the EA and Severn Trent, who work in "partnership" with the city council; as Newman (2001) observe, partnership is inherently difficult.

Less happy with this partnership working are the emergency services stakeholders, who noted that their objections to developments (particularly housing) in areas prone to flooding, were often overlooked. IT gave the example of a recent housing development in Newark, which had been given planning permission, despite

objections from the Police and Fire Services over flooding on the grounds that they could not guarantee emergency cover in the event of a serious flood. Not only does this highlight tensions between planning and emergency planning, but it could also be very problematic for local homeowners in the future.

However, there was concern from wider stakeholders that the desire for meaningful engagement was undermined by the push for growth, with one designer arguing:

> *"We've got a planning system that says on one level, we must have development because the economy needs it, and the other we must consult, and the two are running completely in opposition…"*

There are similar tensions over planning's role in promoting new development, whilst also ensuring quality in design; which was roundly criticised by almost all stakeholders, for being "*weak and ineffective*" on urban design. In contrast, the current head of planning, AG defended their approach suggesting that the quality of design didn't necessarily reflect whether a development was *"good business"*. He was also quick to point out that Nottingham had both a dedicated urban design team and specific city centre urban design guidance, but acknowledged Punter's (2007) point about a lack of design skills within planning teams:

> "*It varies across authorities. We have a team that does that. Smaller authorities don't have anyone… They sometimes struggle"*

This would appear to substantiate the suggestions from designers and planners that acceptable standards of urban design often vary between authorities. Whilst it was suggested that this could also reflect underlying property values, there was some

consensus that political investment and supportive local councillors are critical to design standards and perhaps also resilience measures. Conversely, it was suggested that unscrupulous developers were taking advantage of the political pressure for growth, knowing that planning officers views on design and flood resilience would be overlooked or compromised by elected members. This is substantiated by one former officer who related an incident where she found herself in *"hot water"* with politicians for upsetting a developer, by commenting critically on a politically important scheme. More widely, many interviewees were critical of the subversive influence of local politics on developments; in Chapter 3, Newman (2001) observed that technocratic approaches eroded the accountability of local democratic institutions, however it could also be contended that the involvement of elected officials, erodes the ability to implement technical considerations.

Respondents also reported a slow growth in the uptake of SUDS; at present, SUDS is something that authorities ask for, but cannot be enforced. Where full SUDS proves difficult to implement, FB suggest that they will ask developers to use permeable paving[105]. Ironically however, permeable paving can only be used in private areas, as it is not 'adoptable', meaning that the Council Highways refuses to maintain it[106]. It was also noted that many highway functions are now outsourced to private operators.

In Chapter 3, Newman (2001) argued that 'culture changing' was an important component of holistic governance; whereas this example highlights the difficulties of

[105] Permeable paving is a hard surfacing product that allows a degree of water infiltration, reducing run-off and the likelihood of surface water flooding.
[106] Nottingham use the 6C's Design Guide for highways, which is shared resource amongst authorities in Nottinghamshire, Derbyshire and Leicestershire.

changing practices within local government. Whilst authorities are constantly taking on board new considerations and agendas, this often seems to be done in a normative way that does not change existing roles or ways of doing things. Accordingly, in the examples of both urban design and flooding, it seems to involve new positions and new silos; the creation of new specialist officers can provide a voice within the organisation for particular issues, but they can also reinforce that these specialisms are not for mainstream consideration by others, particularly planners. Whilst it is important to acknowledge that flooding and urban design require a degree of specialist knowledge, it does not appear to be widely considered by planners; identified as problematic in Chapter 2. There also appears to be a lack of technical knowledge amongst officers, and thus scrutiny, on flood design and mitigation.

The policies of austerity and downsizing teams appear to have eroded some flexibility from planners, whilst the interviews also suggest that there are deeply embedded cultures within planning departments and local authorities, which are likely to resist efforts to change. However, planning officers have to consider many different factors, including social, economic and aesthetic considerations, making their job highly complex. Despite this, the study shows that many planning authorities are very selective about who they engage with, most notably a failure to integrate with emergency managers or to act upon input from emergency services. Rather than taking this insular approach, it is contended that collaborative planning could be used to tackle this complexity through 'consensus building' and partnership with other stakeholders (Healey, 2002; Wilkinson and Appelbee, 1999).

Ironically, partnership appears to be the source of problems with flood management finances. As 6 (1997) observed more generally in Chapter 3, making all action on flood management contingent upon partnership finance, increases complexity and decreases LA's ability to deal with 'wicked problems', whilst also fixing the primacy of economic factors within development practices. One of the key lessons of the previous empiric chapter was the danger of only responding to a narrow set of concerns, such as cost, so whilst this push for partnership funding does help to bridge the 'gap' between development and flood defence, it risks increasing inequality because of its reliance on market economics. As new developments will be expected help to finance flood defences, FB noted how in 'deprived areas' there is often a much lower *"ceiling value",* meaning there is less capital to be utilised, irrespective of need or potential risk.

A picture emerges with clear parallels between the issues of flooding and urban design, often being overlooked to cut costs or due to a lack of oversight by local authority officers. There are also concerns that instead of providing accountability, elected councillors politicise development practice. Finally, whilst local authorities have taken on many new responsibilities, such as those from the Flood and Water Management Act, it is not always clear that this responsibility is accompanied by the corresponding power to act, particularly given the dependence on a network of stakeholders for funding and action. However, there is consensus from stakeholders that it is local authorities who should be taking the lead on implementing resilience.

7.6 LOCAL RESILIENCE FORUM AND EMERGENCY SERVICES

A number of key stakeholders who work within the Nottingham and Nottinghamshire Local Resilience Forum (LRF), as well as in emergency response roles, were interviewed for this study. This included representatives from Nottinghamshire Police in the roles of Architectural Liaison Officers (ALO)/Pre-Crime[107], Counter Terrorism Security Advisor (CTSA), and Civil Contingencies Research Officer (IT), whilst a further participant worked for the Nottinghamshire Fire and Rescue Service in the Emergency Planning and Resilience Department.[108] As its name implies, the local LRF covers Nottingham and Nottinghamshire, and is chaired by the Chief Constable of Nottinghamshire Police[109].

Local Resilience Forums were set up in response to the 2004 Civil Contingencies Act (CCA) to provide coordination on issues of emergency preparedness and response.[110] As IT suggests the focus of LRF's is:

> *"…really about consequence management, rather than pre-emptive striking."*

Accordingly, LRF's provide a multi-stakeholder arena for the management of ongoing risks and collaborative emergency plans, as well as engaging a range of stakeholders,

[107] In Nottinghamshire the role of ALO is often shared with a "Pre-Crime" role, which involves outreach and community advice on how to deter crime through the use of security features, e.g. window locks.

[108] The author also attended a Project Argus event organised by the LRF, as a way to understand their ongoing work; Project ARGUS is a NaCTSO led initiative, which asks businesses and other organisations to consider their preparedness for a terrorist attack (NaCTSO, 2012).

[109] Participants suggested that LRF's typically follow the spatial coverage of the local police force, and thus interviewees were all located within this geographic area, with the exception of the ALO's whose work covered a smaller area in northern Nottingham.

[110] The Civil Contingencies Act places a legal obligation for so-called Category 1 responders, comprising the emergency services, the EA, local authorities and NHS health authorities, to come together within an LRF to assess local risks and put in place emergency response procedures, including training and exercises. In addition to this, Category 2 responders, comprising private utility companies and transport agencies, have a duty to co-operate with the LRF.

such as shopping centre managers, to assist with the implementation of emergency procedures. In addition to this, the ALOs and CTSAs, receive specific training to provide pre-application guidance to developments, including theoretically urban design input.

All of the LRF stakeholders seemed to share a cultural understanding of resilience, centred around safety, business continuity and emergency response, which was fundamental to their work. Whilst he would later provide some deeper reflections on the topic, IT provided a simple definition, which is representative of this culture:

> *"For me resilience is coping, it's bouncing back."*

However, it was the work of fire service that appeared to present the most holistic approach to resilience, as KC outlined:

> *"As a fire service we have to be resilient enough that if we have a number of incidents taking place simultaneously within the county, then we have enough resources in place to deal with those, but have enough capability for another incident coming in."*

Within the county the Fire Service assign different resources to different stations, and have detailed plans for how these resources are utilised according to the type of incidents. This also happens at a national level with different fire services providing specialist operations, such as chemical and biological incident units or pumps for dealing with floods, and which contribute towards a nationwide plan. It could be said that the fire service have vertical integration of power, resources and professional activity.

In some respects, this is easier for the fire service as they have a relatively narrow remit and level of responsibility, whereas the work of the LRF is more diverse. Perhaps there is a lesson that as an organisation's remit is widened, so integration becomes more difficult.

The work of the LRF goes through a number of sub-groups, which include risk and flooding. The risk group, which IT chairs, use confidential information from the National Risk Register applied with local knowledge to determine and prioritise the most significant risks to Nottinghamshire; subsequently recorded within the Community Risk Register. Interestingly, IT's role within the Police force was specifically created to reappraise risks within a framework of austerity and diminishing budgets; in effect, assessing what resources are safe to cut.

Given their work within the LRF, many of the stakeholders were well informed about the most significant local risks, which include pandemic influenza and flooding.[111] As a consequence of this local risk landscape, the flooding sub-group is one of the most significant and active parts of the LRF. Unusually, it does engage with new developments which are sometimes raised within the group, however this only occurs once, *"the planning is on the lamp post"*, and the group are very limited on how much influence they can exert; having *"no teeth"* or powers to enforce, despite their specialist knowledge, and there was thus frustration that they were often ignored. On the limitations of the LRF, JS notes:

> *"The LRF is not a legal entity, it has no legal powers, no budget, so it does depend on good will."*

[111] The exception was the CTSA who displayed quite a limited view of local risks, only talking about how there is "always the potential" for a terrorist attack.

There was further consensus amongst stakeholders around how their work was constrained by funding; with LRF's having no budget themselves, finances are always tight and they are reliant on contributions from the diminishing funds of engaged organisations; in effect, the LRF's vertical integration is hampered by a lack of power and resource (Wilkinson and Applebee, 1999)[112]. Several interviewees also noted that local authorities were often the least willing or able to contribute financially to LRF initiatives.

In spite of this financial constraint, the LRF does engage a very great number of organisations; in addition to the core responders, it also has strong links to a range of local charity and voluntary organisations, who are called upon in the event of an emergency (such as church groups and mental health charities). In contrast to built environment stakeholders, the LRF do try to work with the ongoing operation of facilities, organisations and communities, and all LRF members interviewed were helpful, open, keen to engage and engage others with the research. A key theme amongst the participants was how the LRF allowed them to establish informal networks and contact, so that they knew and were comfortable contacting the right people when an incident occurred; in effect, acting as a 'soft space' (Haughton et al., 2011) which promotes horizontal integration of holistic governance through loyalty and trust. Within Chapter 3, Brassett and Vaughan-Williams (2013) suggested that these qualities created a form of 'community resilience', however it could also be termed 'collaborative resilience' (Goldstein, 2012); in effect, using the catalytic effect of risk in a more proactive way.

[112] Much of the work of the LRF is expensive, such as organising training, outreach events and particularly exercises; hence a lack of funds limits the number of events that they put on.

However, LRF members noted that whilst they still worked successfully with LRF members in other geographic areas, this was more difficult since the demise of regional governance and the Regional Resilience Forum. Further, the interviews also highlighted a number of problems with the current function. Referring to how health authorities fitted into the LRF following their *"massive change"* and reorganisation, JS suggested that they were currently in "disarray", and very difficult to engage.[113] Whilst some interviewees noted that it was, *"more difficult to integrate with the private sector"*, perhaps because of differences in priorities, there was greater concern about the relationship of LRF's with local authorities and potentially planners. As IT notes:

> *"We are well embedded, but it tends to be at an emergency level... it would be difficult to speak to a planner."*

Respondents observed that there were variations between the degrees to which the different authorities were engaged. Emergency managers at Nottingham City suggested that, "*we as an authority don't get as much buy in as we would like"*, whilst the City Flood manager was also a little cool about the usefulness of the LRF. By contrast the emergency manager at Nottinghamshire/Rushcliffe was more positive and engaged. Regarding the limitations of their work, IT noted:

> *"It would be better for us that there were fewer incidents."*

[113] Whilst at the Project Argus event the author spoke to a number of people working in resilience within the NHS, however none of these had an outward facing role, instead focussing on "outbreak control" and "contamination procedures". Consequently, it did not prove possible to engage anyone from the NHS or ambulance services within this research.

In effect, this substantiates Bosher's (2014) argument (Chapter 4) that civil contingencies are primarily about planning to respond, rather than a more proactive or forward looking resilience. It was suggested that whilst the LRF responders had a clear shared purpose on issues of emergency response, when it came to more proactive approaches, critical tensions emerged between emergency responders and local authorities. So whilst emergency services priority is to deal with emergencies, the local authorities have to consider this, as well as stimulate economic growth and co-ordinate flood strategies, to name just a few responsibilities.

It was clear that all of the LRF stakeholders felt that there was more that they could contribute proactively towards the resilience of the built environment, but there was no clear consensus on whether the LRF was the place to do this. IT offered some of the most thoughtful reflections upon this, suggesting that the differences between local authorities and other LRF responders was probably not reconcilable, given how development planning was often subverted by politics, money and influence.

IT further suggested that greater public education should be the LRF's focus for new work, perceptively identifying the *"big problem"* of public disengagement from emergency planning; as opposed to countries like Japan and Australia, where citizens are used to emergency drills and managing their own risk. Again, he suggested that further funding was needed for more public engagement. However, the ALOs interviewed offered an alternative view of public involvement:

> *"I don't think the general public want to be involved, I think they want to be assured."*

This seems to accord with the stakeholders who noted how the general public often expected that their risk would be managed by the emergency services and local authorities, whereas householders are ultimately responsible for protecting their property from flooding. Perhaps this highlights the need to promote public awareness and engagement on risk management.

In terms of urban design input, as this section has indicated, the LRF's input is limited. ALOs do ongoing work with designers, developers and planners offering pre-application advice and commenting on applications, and described themselves as having a "good relationship" with all these stakeholders. However, their engagement seemed to be focussed on very small-scale housing, where there was not necessarily an experienced designer on-board.

Part of the CTSA's role is to work with built environment stakeholders; however the interviewee was very resentful about how little involvement he had with designers and planners. Digging further, it was unclear what outreach, if any, he had conducted towards these stakeholders. As an example, he admitted that they had not run an Argus Professional event in his four years in the job, but suggested that the turnout for these had been *"disappointing"* in the past. In addition to this, he was also rather defensive about his knowledge of built environment and development issues. Interestingly, he noted that LA planners were similarly unwilling to engage him, however it was suggested that they were concerned that he would identify a risk that they would have to act upon. In effect, that they were deliberately ignoring the risk.

More positively, the LRF have produced a short guidance note for local planning teams to assist with applications for developments in flood zones, in accordance with the NPPF. Broadly speaking, the document outlines the limitations of emergency services cover, suggests that there are emergency plans made, including access and egress, and advises on the use of property level flood mitigation. It is unclear how extensively it is used within Nottingham City, although an interviewee asserted that it was well used within the County.

This document hints at potential ways for LRF members to engage in more proactive involvement in the development process, in effect helping to address the ongoing use of developments that built environment stakeholders struggle to influence; whilst the LRF's risk based approach, closely mirrors the risk management process identified in Chapter 4, as being the first stage in promoting resilient urbanism. Furthermore, the governance model of the LRF is close to the exemplars identified within Chapter 3, utilising 'soft spaces' that promote more informal relationships amongst stakeholders for successful collaboration, and 'fuzzy boundaries' for working with neighbouring organisations (Haughton et al., 2010). There are also elements within the LRF organisational hierarchy that hint at the vertical and horizontal integration critical to holistic and collaborative models offered in Chapter 3. However, the literature review of resilience in Chapter 4, identified resilience as an ongoing cycle of preparedness, response, recovery and mitigation; the work of the LRF focussed too much on response and recovery, but struggles to proactively engage with preparedness and mitigation.

More widely, there are significant barriers to extending the work of the LRF, in particular a lack of power and resource, whilst a tension emerges if the LRF are given greater power, for example being a statutory consultee within the planning process, would this make it more difficult for the LA to be involved or even preclude its involvement? Would it be more effective as an informal, 'soft space'? Similarly, there is a lack of built environment stakeholders within the LRF, but would their inclusion expand the group too widely for meaningful engagement, and dilute the strong informal and personal relationships that are formed? It is also apparent that in spite of the desire for these stakeholders to be more engaged within the development process, they lack the skills, knowledge and training to do so.

Finally, the biggest barrier to the adaptive capacity of the LRF is evidently the scarcity of funding, which is likely to limit not just existing efforts, but new initiatives and collaborations.

7.7 ENVIRONMENT AGENCY AND UTILITIES

As flooding has emerged as the key hazard within Nottingham, so this section correspondingly concentrates on the group of stakeholders most focussed upon this hazard. Thus, officers from the Environment Agency (EA), in the positions of Senior Incidents and Emergencies Officer (MG), Planning Advisor (GP) and Flood Risk Manager (DW), were interviewed. Two further participants from private utility companies also contributed to this research; the manager of Western Power Distribution's (WPD) emergency Planning Department (CH) and a member of Severn Trent's (ST) Strategies Team dealing with sewer flooding (TS). All of these

stakeholders are engaged with the Nottingham and Nottinghamshire LRF, and all have seen their roles change as a result of 're-scaling' and partnership working.

Perhaps significantly, these stakeholders covered a very large geographic area; MG's work covered much of the Midlands from Birmingham to Nottingham, DW's work was centred around the River Trent from Nottingham to the Humber Estuary; reflecting a sub-national (sometimes termed 'areas') focus, following the abolition of regions. The utilities cover an even larger area; ST supplies customers from Scunthorpe in the north, across the Midlands, down to Gloucester in the south, including over 90,000km of sewers. WPD network covers a similar area of the Midlands, southwest and Wales, supplying 15 million people with 250,000 substations and over 200,000 miles of cable.

The EA is a non-departmental public body with responsibilities relating to environmental protection and as such, they are a statutory consultee on flooding within the development process. The private utility companies have limited engagement with the development process, primarily relating to connection and supply of new developments, but both have resilience teams who work to ensure continuity of supply.

Despite the apparent diversity of these stakeholders, they seemed to broadly share an understanding of resilience as continuity, 'business as usual' and as a way of managing adversity with minimal long-term impacts. For WPG resilience means making accommodation for changing circumstances to ensure there is constant supply:

"resilience means having mitigation plans in place… how do we stop substation flooding, put in mitigation measures… you might choose to move that substation, or put it up on a pole."

ST have many staff looking at many different aspects of resilience, but for TS, resilience is about, *"sewer flooding when problems are complex and multidisciplinary."* This could be said to be a narrow approach to resilience that only considers the topic from a single perspective, but it does demonstrate appreciation of how problems transcend conventional boundaries and require many stakeholders working in collaboration to address. The EA have many duties and roles, but with regard to risk, it is also a regulator for environmentally hazardous activities. Notably, several of the participants stated that this is now being scaled-back in an effort to cut costs and as a result of the political will for less 'red tape'[114]; MG outlines the shift in the EA's role:

"Our director, I think he's gone on record as saying that we used to be a regulator that also responded to incidents, now he wants us to be an incident responder that also regulates ... But resilience is very much at the top of the agenda for the EA."

In terms of flooding, this has also seen a change in the way the EA operates; as outlined within the local authority stakeholder section, the EA is no longer taking the lead on flood mitigation instead Officers like DW have a role to:

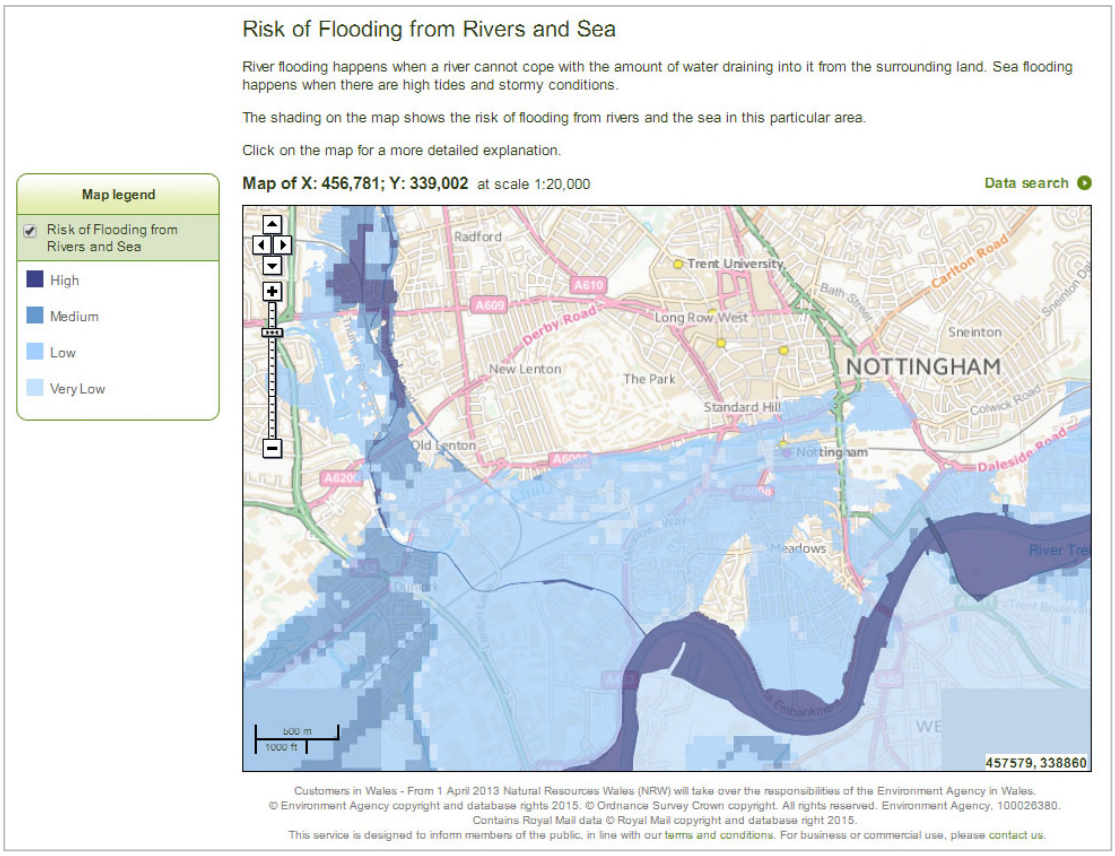
"Highlight future development sites and incorporate them within a flood risk management strategy."

[114] It was suggested that the increase in fires at waste sites is a consequence of this policy.

This modified approach to partnership working has potential benefits, in terms of greater stakeholder engagement and promoting development, but as outlined within the governance literature review, bringing in more stakeholders can complicate the process (6, 1997). Within the study area and in addition to the stakeholders interviewed, flood management also involves internal drainage boards (IDB), private landowners and affected communities.

The EA continue to produce the flood maps for fluvial and surface water, but not sewer flooding which is the responsibility of the privatised utilities. Whilst the EA appear to be moving towards a more generic indicator of flood risk, e.g. low to high, it still uses “flood zones” for fluvial flooding which indicate the annual probability of flooding; see figure 7.4, below. This shift away from quantitative measures could be a reflection on the limitations and problems of this approach (White, 2013).

Figure 7.4 – EA Flood Map for Nottingham



(Source: Environment Agency, 2015[115])

However, it appears that EA powers for limiting flood risk in development have been eroded by the NPPF. Worryingly, whilst the NPPF requires that the EA are involved with the planning of sites with flood risk under the "Sequential Test"; GP suggested that this, and EA involvement, could be bypassed where LA's do not have an NPPF-compliant local plan or a five year land supply for housing. In these instances, the NPPF's 'presumption in favour of sustainable development' comes into force and sites must be automatically approved, without EA involvement. This is one example of such a loophole, but other stakeholders felt that the attempt to 'simplify' planning processes had potentially left others.

[115] http://apps.environment-agency.gov.uk/wiyby/37837.aspx

The primary risk for utilities is adverse weather and floods, and their impact upon supply. Furthermore, under their contract with Ofwat, water companies have a duty to effectively drain their operating area, but there are significant grey areas around the level of coverage they apply. FB suggested that ST have a strategy for intervention based on cost benefit analysis, if it is too expensive, they will go down the route of property mitigation measures. Broadly, they provide cover up to a 1 in 30 year event, but sometimes this is 1 in 40 for areas where many properties are potentially affected; significantly these are levels of flood risk that would be considered within the most risky category for fluvial events.

It is also not clear what the duties of private utilities have in relation to extreme events, when different sources of flooding interact and responsibilities become blurred. In these examples it is now the duty of LLFA, who are there to lead investigations into flooding, but as TS observes:

> *"LLFA are growing in their understanding and expertise... but there is a concern that they're really stretched the teams, and they're juggling lots of burdens and lots of duties, and a shrinking resource, shrinking workforce. And that makes it hard for them to do what they want to do."*

Accordingly, the extent to which these organisations now work together extends beyond simply co-operating as part of the LRF. In the example of flooding, *"gone are the days when a national government could wholly fund a scheme",* and thus the funding currently in place is conditional on forming partnerships. The Government contribution to flood schemes is based upon a 'partnership score', with the EA and LLFA officers having to find ways to fill this 'shortfall'; increasingly these financial

contributions are coming from new housing developments, via Section 106[116] agreements. This is problematic, as residential development has been identified by stakeholders as the greatest source of increased flood risk; by making flood mitigation measures dependent on allowing more residential development, risks worsening the overall flood risks. Furthermore, pots of funding are now national, meaning that schemes in Nottingham will be competing against other parts of the country; potentially increasing spatial inequality as under-resourced authorities struggle to compete for funds. A final source of funding is provided by the Regional Flood and Coastal Committee (FRCC)[117] which has an allocated budget that can be spent as a 'local levy' to support schemes with a shortfall that they see provides a local benefit.

These new funding arrangements make it ever more difficult to fund a scheme, given the variety of stakeholder priorities, and further raise the threshold of outcome expected; as one respondent suggests, many of the *"easy wins"* are now gone in terms of flood defences. It is also apparent that these policy changes represent a rescaling of risk away from central government; noting how the EA's work attempts to involve local communities, DW suggests:

> *"There's a general moving away from having to provide a one in a hundred year flood defence structure, to allowing communities to maybe themselves maintain watercourses."*

[116] Section 106 is a form of 'planning gain', now enshrined within the NPPF, where a development is allowed on condition that it makes some form of contribution, usually financial, towards public services.

[117] Formed as a condition of the 2010 Flood and Water Management Act, the 12 RFCC's bring together the LLFA and representatives of the EA within a region to make collaborative plans, harmonise spending and provide a link between stakeholders. It is populated by locally elected officials, rather than flood experts.

The EA already have a scheme called *Floodwatch*, which provides flooding alerts to communities, but community based activities are now being expanded to include training the public to perform specific roles in the event of flooding, such as putting up temporary flood barriers. Rather than providing opportunities for local voice and engagement, these approaches appear to be shifting responsibility to local communities, whilst it is unclear whether they have the resources or desire to fulfil this new relationship, or that this new relationship has been adequately communicated to the communities involved; clearly there is a danger that these new groups will have 'responsibility without power' (Peck and Tickell, 2002) or that communities unable to manage this risk are stigmatised as not being sufficiently resilient (Dombrowski, 2010).

From an urban design perspective, these stakeholders primary involvement was using SuDS as a means to reduce flooding. The EA are particularly keen to promote the use of SuDS, but noted considerable variation in uptake amongst LAs, who have the final say over the approach. As DW described with one notable example:

> *"I think some councils are better than other, particularly Leicester City Council are quite good; Charnwood. Melton maybe not so good! Seeing as how they relocated their own offices from an area of no flood risk into an area of flood risk, and then argued as much as they could not to use permeable paving or any SuDS features, because the insurance that they got from their original office building burning down wouldn't meet the cost for it."*

DW also acknowledges that until SuDs approval bodies are in place there is a legitimate problem of maintenance:

"At the moment there's a bit of a gap there, developers say they've got no-one there to maintain, and we tend to push them towards private maintenance companies."

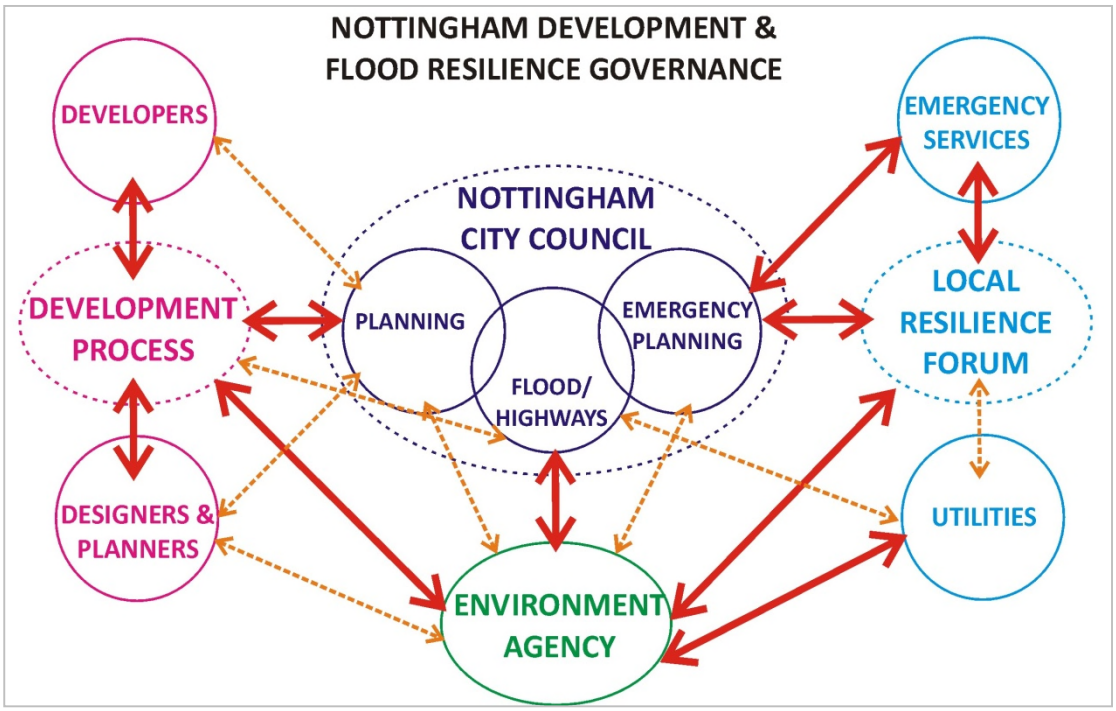
However, the local water company suggested they wouldn't allow connection to the water system, if there was private maintenance of SuDS. This issue of maintenance illustrates the lack of integrated policy that currently prevails within the arena of flooding. More widely, rescaling of responsibility seems to have resulted in more fragmented governance and inconsistency of approaches, which potentially increases the risk of flooding by making mitigation more difficult.

More positively, stakeholders appear to be making significant changes to the way they operate, and in particular are collaborating with some success. However, the capacity to do so is limited by the increased complexity of partnership and a diminishing source of funding from the public sector. Furthermore, this more limited funding no longer appears to be on a need basis, being contingent more upon the capability of the partnerships and the skill of the LLFA, than any assessment of risk.

7.8 CONCLUSIONS

Key to this study is an understanding of the inter-relational networks of stakeholders, which shape participants' involvements, influence and actions. Figure 7.5 below, provides an overview of how the different stakeholders, who participated within this research, were connected within Nottingham; displaying both full and more limited engagement.

Figure 7.5 – Nottingham Flood & Development Network



(Source: Author)

It is important to acknowledge that this model is for the city only, and that it was not possible to provide a similar model for Nottinghamshire without better access to these stakeholders. With the 'local turn' in resilience practice (Coaffee, 2013a, 2013b), the City Council are the central institution in the practices of development and resilience which this study considers. Whilst generally well connected, the LA's engagement profile is something of a paradox; being strongly connected with many outside organisations, and being further composed of many internal professions and specialisms, it is ironic that the two departments of planning and emergency planning, which are most critical to this study, have very little involvement with each other, whilst the LRF stakeholders were also disconnected from local planning authority decisions.

The figure does demonstrate how well connected the EA are within both development and emergency response circles, however further investigation uncovered how their regulatory work is diminishing and being increasingly 'rescaled' to other stakeholders. Although it was not possible to provide this same model for Nottinghamshire, it is apparent that there are greater inconsistencies of structures and approaches, within the two tier system. Tables 7.1 and 7.2, below provides a summary of stakeholder approaches to resilience and development.

Table 7.1 – Summary of Development Stakeholders

Groups	Temporal Involvement	Risk/Resilience Engagement & Integration	Priorities, Contemporary Concerns & Adaptive Capacity
Designers	Design to Construction, some Preparation.	Limited engagement with risk, appreciation of resilience as adaption and persistence. Some integration through design team. Power and resource provided by Developer.	Client/developer priority. Some concerns about lack of work. Change from traditional contracts, has limited influence. Problem solvers, interested in innovation.
Planners	Preparation to Pre-Construction	Little engagement with risk. Economic focus on resilience as long-lasting. Collaboration is part of planner's role. Integration through planning process.	Economic priority. Focus on bureaucratic processes, rather than vision.
Developers	Preparation to Construction, with some use and operation.	Financial risk management; hazards and threats often rescaled to designers and end-users. Limited resilience engagement. Some integration through design team.	Financial returns. Spending on design is often difficult to make recover. Constrained by financial norms and culture which discourages innovation.
Commercial Agents	Preparation and some Pre-Construction	Financial risk management; understand resilience as adaptability within property market. Engaged with client.	Long-term financial viability of property. Appreciation of adaptability.
Local Planning Department	Preparation to Pre-construction.	Little engagement with risk. Strong internal integration, but external is limited to planning process.	Focus on development viability and numbers of housing. Austerity constraints. Lack of resources, expanding workload and 'intuitional inertia' make change difficult.

(Source: Author)

Table 7.2 – Summary of LRF Stakeholders

Groups	Temporal Involvement	Risk/Resilience Engagement & Integration	Priorities, Contemporary Concerns & Adaptive Capacity
Emergency Managers	Limited Pre-construction and Use.	Actively manage risk, preparedness and emergency response, but little proactive resilience. Horizontal integration with LRF, but little relationship with planning officers or built environment professions.	Focus on 'planning to respond.' Limited resources, integration and training on development issues, limit ability to change.
Flood Managers	Some Pre-Construction and Use	Risk based approach to mitigation. Understand resilience as return to normal. Some integration with both LRF and planning officers. Strong links with utilities and EA.	Powers are limited by overdue legislation. Limited resources, lack of power and need for partnership, constrain change capacity.
LRF & Emergency Responders	Limited Pre-Construction and Use.	Risk based approach to emergency response. Strong integrated, 'business as usual' understanding of resilience. Strong horizontal integration with LRF stakeholders, constrained by lack of resource and limited ability to influence development process.	Limits of reactive measures and difficulties of implanting more proactive approaches. Uncertainty from restructuring of organisations. Diminishing resources and lack of built environment training. Understanding of resilience and adaptability.
EA	Pre-construction and Use.	Risk based approach to flood and environmental hazards. Integrated with development process and LRF. Decreasing remit and recalling responsibilities to others.	Shift from regulator to emergency response organisation. Diminishing resources and increased partnership model.
Utility Companies	Use.	Risk based approach to interventions. Integrated with LRF, but often variable.	Intervention and action is based upon 'best value' for customers. Approach is dictated by Government utility contracts.

(Source: Author)

In many respects, the engagement of different stakeholders with the research appears to mirror their engagement with the broader issues of resilience; emergency responders and emergency planners being the keenest to be involved, with local authority planners the least willing to participate. However, it is also important to

note that many of those who did participate, particularly amongst designers, had links to higher education and thus are not necessarily representative of their professions more widely. Similarly, this willingness to engage in the research appeared closely related to participants' work.

More widely, the research made plain both the primacy of economic concerns within a host of decision-making practices, but also how the concept of "entrepreneurialism" (Harvey, 1989) continues to permeate urban governance, through the promotion of 'partnership' and thus private financial contributions to flood mitigation. It is telling that Nottingham's head planner only agreed to participate in the study following an introduction from a commercial development agent. This reinforces how increasingly the work of LA's and planning officers is about enabling growth and responding to Central Government's push for less "red tape". Further squeezed by austerity, staff cuts and political will, it is perhaps unsurprising there appears to be little uptake of the NPPF's new responsibilities for resilience; evidenced by LPA's 'ignoring' concerns by the emergency services that developments are going ahead in areas of flood risk. There is a further risk that this rescaling represents a further 'hollowing out' of the public sector (Begg, 2002; Knox and Pinch, 2007) and that authorities will not be able to meet the additional cost that resilience measures inevitably involve (Walker and Salt, 2012).

Perhaps this unwillingness to engage with both this research and the wider resilience agenda is also influenced by the 'constant vilification' of planning, which AJ suggested had left it *"badly lacking in confidence".* The result is that LA functions are increasingly narrow and 'locked-in' to normative approaches; demonstrated by the

new siloed positions addressing urban design and flood management, as well as the criticism of highway engineers' intractable approaches, exemplified by their rejection of porous paving which contradicts their own guidance on flood management. This lack of "joined-up" policy, demonstrates the danger of "technocratic" approaches that 6, et al. (2002) highlight, regarding every new problem as a technical agenda to be addressed by specialists, as well as the difficulties of institutional change (Stoker, 2004).

Moreover, the research touched upon the issue of local services being increasingly outsourced to the private sector, supposedly to save costs, but with little consideration of how this will affect capacity to react to changing circumstances.

Within the private sector, there is a similar focus on viability and minimising costs; it was noted how the composition of developments are typically 'fixed' by economic norms, before designers and planners become involved. Accordingly, developers and commercial agents were identified as key actors, but whose work was predominantly informed by prior economic history and short-term profitability, seeking to rescale physical risks to other stakeholders. Worryingly, many of the incidents highlighted in the previous chapter, came about when 'maladaptive' approaches were perpetuated, rather than adapting with more appropriate or contextual responses.

The pervasive, but largely unseen influence of these economic imperatives perhaps supports the contention of MacKinnon and Derickson (20011) that theories of resilience have been naive in overlooking the forces of global capitalism. Despite some suggestions of how this could be altered by new models for investment, there

was cynicism over developers' ability to change, without being 'pushed' by government legislation.

Flooding was identified as the key local hazard, particularly within residential developments, where it was suggested that the risks of flooding were all too often overlooked. More broadly, there have been significant changes to the local governance of flood management, reflected by the new responsibilities of LA's as LLFA. Most significant, however, are the changes in funding which are now conditional on partnerships, meaning that flood mitigation is always tied to another development or agenda, rather than judged on a risk basis. Furthermore, funds are predominantly national, requiring competition between localities; typical of "entrepreneurial" urban policies (Harvey, 1989).

Healey (2002) defines 'institutional capacity' as being about power and control structures. In the case of flooding, as exemplified by the vagaries of SuDS adoption, LA's are increasingly reliant on partnership with a range of outside stakeholders. The difficulties of controlling these other stakeholders with their different priorities and desired outcomes, coupled with limited or conditional funds; severely curtails the LA's power, control and thus 'institutional capacity'. In this context, Newman's (2001) imperatives for successful partnerships, based upon accountability, pragmatism, flexibility and sustainability, seems overly simplistic and appears to overlook the need for common outcomes.

Furthermore, the governance of flooding is overly complex, making it more difficult for stakeholders to overcome this 'wicked' problem (6, 1997). Most worryingly, the suggestion of "ceiling values", in effect limits on how much developments in more

deprived area can fund flood mitigation, suggesting spatial outcomes of greater financial inequality manifested in physical risk; what Beck (1992, p.12) calls *"loser regions"* or Harvey (1989) refers to as a *"spatial fix"* as the physical landscape of risks is reconfigured by economic forces. These issues build a case for looking in greater detail at the design and implementation of developments and the integration of flood risk mitigation.

More generally, the governance of flooding seems to be moving towards the LRF model of greater horizontal integration, but appears to also share the lack of power through vertical integration, as responsibilities are scaled downwards without the necessary resource or finance. This model is not without value, as the informal relationships or 'soft spaces' that are created, facilitated increased trust and collaboration between different stakeholders (Haughton et al., 2010). However, the hard boundaries and profound differences in governance structures between authorities, in this case between city and county, limit the ability to work across geographical regions, which is critical for addressing flooding. Furthermore, as the EA move towards a response role, rather than managing flood risk themselves, this is an obvious move towards greater deregulation and 'hollowing-out' of state function (Begg, 2002, Knox and Pinch, 2009). Further, new initiatives seem to lock-in old structures and maladaptations, or just create greater complexity.

From a planning perspective, the process of producing forwards plans is always going to be difficult, but it appears increasingly politicised and economised, with numbers of housing overriding all other considerations. Further, there appears to be a lack of creative thought and innovation amongst stakeholders; this is particularly significant

given the key role of change in resilience practice (Walker and Salt, 2012; Zolli and Healey, 2013; Wilkinson, 2011).

This chapter has assembled a variety of views to lay out the inconsistent Nottingham Governance structures for resilience and development, as well as a corresponding lack of integration between policy areas. Whilst a reasonably strong system for emergency response seems to be in place, it is not really pro-active or integrated within development practices. In contrast to Bosher's (2014) assertion that designers and architects are insufficiently engaged with issues of resilience, this research has suggested that many are well informed, but that development practices are limited by economic norms and obstructive governance structures. Accordingly, development processes fail to meaningfully engage with communities and the ongoing management of places, or to address local risks in a substantive way.

What is needed is a 'transdicsiplinary' approach that 'builds consensus' (Healey, 2002) from a range of stakeholders, including the under-represented end-users and general public. Despite a variety of sources noting the lack of skills and general poor decision-making relating to urban design, this study contends, with support from the literature review, that the process of urban design can be the medium for integration of these agendas, as well as the more cultural values of place and community.

This requires a re-examination of the inter-related roles of planning and urban design; planning should provide the strategic framework, including the identification of locally significant risks, whilst urban design provides the process to implement mitigation and adaption through contextual design, utilising consensus building.

Accordingly, the following chapter will examine in greater detail the implementation and urban design of housing development, including the practice's engagement with flood management, utilising the understanding of 'design weaknesses developed in Chapter 6.

8 NOTTINGHAM URBAN DESIGN & FLOOD RESILIENCE STUDY

8.1 INTRODUCTION

It is the intention of this third and final empirical chapter to draw together a number of key threads which have emerged in the preceding chapters, through a series of design vignettes which explore the implementation of urban design and flood resilience measures within the local context of Nottingham and study these processes in action.

The review of global urban incidents, within Chapter 6, outlined the complex nature of failures which lead to urban disasters, involving multidisciplinary interactions between a diverse range of stakeholders and underpinned by the identification, assessment and determination of risk.

This analysis was developed from Fisher's (2012) contention that resilience enhancement is contingent upon understanding earlier failures, as a means to inform adaption strategies; this understanding is also utilised within this chapter. Accordingly, the concept of maladaptation (Barnett and O'Neill, 2010) was used to categorise the development practices which diminish the resilience of the built environment, and which operate at a number of different speeds and scales, determining their eventual impact. It was further argued that maladaptations occurred within three distinct areas of work: design, governance and management. These broad areas of maladaptations were further distilled into 9 'Design

Weaknesses', and within this Chapter are utilised to evaluate the Nottingham design vignettes.

Moreover, the analysis of global incidents reinforced the importance of the resilience change paradigm, identified within Chapter 4, by noting how many of these maladaptations were a result of specific failures to change or adapt. Conversely, there is increasing consensus that the key to building enhanced resilience, is through improving 'adaptive capacity' (Walker and Salt, 2012; Zolli and Healey, 2013). Furthermore, adaptive capacity encapsulates not only efforts to be more flexible and usable within different circumstances, but also of how adaptive measures are more contextual, site specific and relevant at a local level (Galderisi & Ferrara, 2012).

It is also significant that this work builds on the understandings gained from the literature review of urban design in Chapter 2, which outlined a genealogy of practice and theory from the start of the 20th Century to the present. This identified a series of 'paradigms', which promoted different theories, practices, objectives and drivers for urban design, but which too often failed to address all the necessary considerations of the complex urban context, and in particular, placed too much emphasis upon the organising influence of good urban form. Furthermore, the growth of urban design practice can be attributed in part to the splintering and siloing of planning, design and implementation, as the public sector disengaged from urban development, which is itself increasingly driven by economic priorities and 'bigness' (Koolhaas, 1995; Moore, 2012).

As a result, urban design increasingly acts as an “interface” (Oc and Tiesdell, 1996, p.5) and as a ‘transdisciplinary space’ (Waldheim, 2008) for considering planning, design and wider issues collectively. This echoes findings within reviews of both governance (6 et al., 1999) and resilience (Coaffee, 2013a), which highlight the need to address issues in a ‘holistic’ way, including how the process of design and development sits within a wider temporal context. Accordingly, it is concluded that urban design should be considered as an ongoing socio-spatial process (Corner, 2006; Carmona, 2014; Madanipour, 1996), involving the technical, creative and social elements, and organised by the second-order design of governance (Adams and Tiesdell, 2011).

Chapter 7, which considered Nottingham Governance Challenges regarding attempts to enhance resilience, uncovered the fragmented networks of stakeholders, which underpinned decision making on development and flooding within the area. Furthermore, stakeholder’s different understandings and engagement with the concept of resilience through new policy mechanisms, including CCA and NPPF, contributed to the disconnected and varied practice of resilience. Whilst the “soft spaces” of the LRF highlighted potential opportunities for wider collaboration and “consensus building” (Healey, 2002) between stakeholders, these were too often challenged by “entrepreneurial” (Harvey, 1987) approaches which promoted reductions in “red tape”, and further constrained by Government cuts and austerity.

More specifically, flooding was clearly identified as the key local risk, with residential development also emerging as the critical medium; being both the predominant

development type within the study, but which was also highlighted by many stakeholders as being particularly poor at addressing the hazard of flooding.

It is contended within this study, that urban design can be the critical location for enhancing resilience. More specifically, it was argued within Chapter 4 that opportunities for resilience enhancement lie within risk assessment, foresight and preparedness; integrated governance and planning; and holistic urban design and planning. Thus, urban design strategies for enhancing resilience need to be integrated, contextual and promote adaptive capacity.

To illuminate the adoption of resilience in context, this chapter utilises a number of small 'vignette' projects, which form three "micro case-studies", at the critical local scale (Coaffee, 2013a), to explore how the urban design of residential development responds and is informed by local flood risk, whilst also offering an opportunity for a more detailed review of how individual projects are realised, including an appraisal of urban design techniques and successes. As outlined within the Methodology chapter, this format allows the exploration of each development as a short story, utilising information drawn from secondary sources, detailed stakeholder interviews, flooding and environmental reports, local planning guidance and planning submissions packs, including drawings, illustrations and design material, as well as officers' reports and committee minutes, relating to the planning application process.

Three vignettes will be presented; the Meadows vignette looks at recent flood defences on the River Trent and adjacent residential neighbourhoods. This micro-case study is particularly pertinent to the study, comprising as it does existing

residential areas with a significant flood risk, recently completed flood defences, as well as ongoing and completed residential developments. It will highlight how these three developments have addressed the issue of flood risk and whether this response is proportionate and appropriate.

A vignette focussing on a new and major residential development within the Nottinghamshire Borough of Rushcliffe considers how urban design and flood risk management develop within this context. In particular, it will reflect on how developers attempt to design out flood risk, highlighting the difficulties of different governance arrangements, as well as the importance of ongoing maintenance and adoption.

A third vignette considers surface water flooding and drainage from the perspective of two residential focussed schemes. At Bakewell Drive, this study reflects on a recently completed residential development, which was the location of a major flash-flooding event which occurred in 2013. By contrast, Ribblesdale Road is an existing residential location where SuDS inspired, rain gardens, were retrofitted to address a number of urban water concerns. Appropriately, both examples offer urban design and flood mitigation learning opportunities.

Together, these cases provide insights into how local development practices and institutions address issues of flood risk and resilience, understood through the Design Weaknesses, as well as the linked concepts of maladaptation and adaptive capacity. The chapter concludes with a series of more general observations and lessons drawn from this work.

8.2 MEADOWS VIGNETTES

The Meadows is a predominantly residential neighbourhood of Nottingham, located close to the city centre and named after the area's historic water meadows. It is bounded by the River Trent to the South and sits within the river's natural flood plain; location is shown in Figure 8.1. Following severe flooding in 2000, the Fluvial Trent Flood Risk Management Strategy (EA, 2005), recommended that settlements adjacent to the river in Nottinghamshire should be provided with a flood defence to protect against a fluvial flood up to a 1% (1 in 100) annual probability, which approximates to what is known as Flood Zone 2.

The resulting scheme was an extensive defence covering a 27km stretch of the river, protecting 16,000 homes and businesses, and coming in at a cost of £44 million[118]; see Figure 8.2 for scope. At the time of completion, the Nottingham Left Bank scheme was the largest inland scheme completed by the EA using wholly Government funds.[119] One interviewee suggested that under the current formula, it would now require £20 million funding from the City Council, which would be all but impossible within the present economic climate.

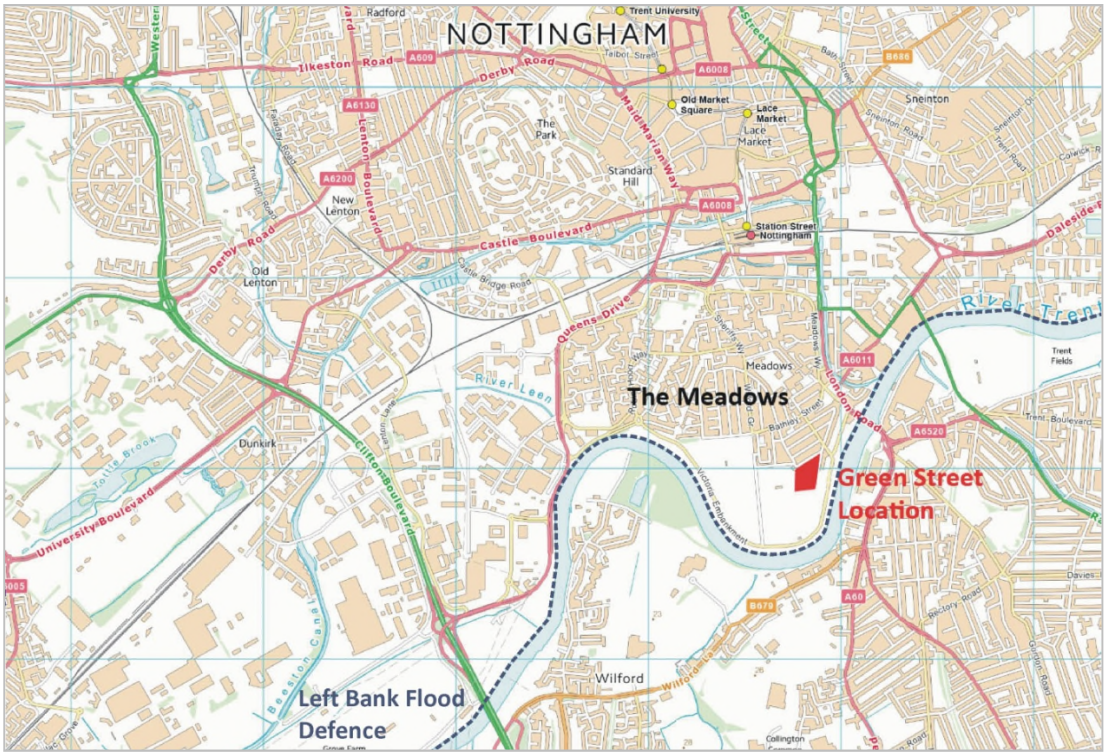
Works within the Meadows were extensive; as illustrated in Figure 8.3 the scheme involved replacing and raising nearly 1000m of flood walls on the Victoria Embankment, as well as adding 900m of new 1.5m high flood walls and 715m of new 2.5m high flood embankments, all within a sensitive context that included a listed War Memorial and associated parks. Figure 8.4 and 8.5 show how flood walls

[118] Actually a cost saving from the original £50 million budget.
[119] Pointedly, several stakeholders noted that with new funding arrangement requiring partnerships to finance flood defences, it is unlikely that schemes of this scale will happen in the near future.

complement the formal setting of the memorial and garden, whilst Figure 8.7, shows how subtle earth-shaping has provided both flood defence and additional water storage within the playing fields. Finally, Figure 8.6 shows the Left Bank from the South side of the river, where new flood mitigation is indiscernible within the riverside promenade.

The scheme's design is contextual, unobtrusive and has no adverse impact upon the area's townscape, demonstrating that risk reduction measures can actually enhance their setting, when designed-in from the outset (Coaffee and Bosher, 2007). Furthermore, several stakeholders highlighted the co-benefits that had accompanied the scheme, including improved sports facilities and riverside access. However, given the recent changes in financial arrangements (see Chapter 7), it also demonstrates the advantages of need based funding, rather than being contingent upon a partnership arrangement.

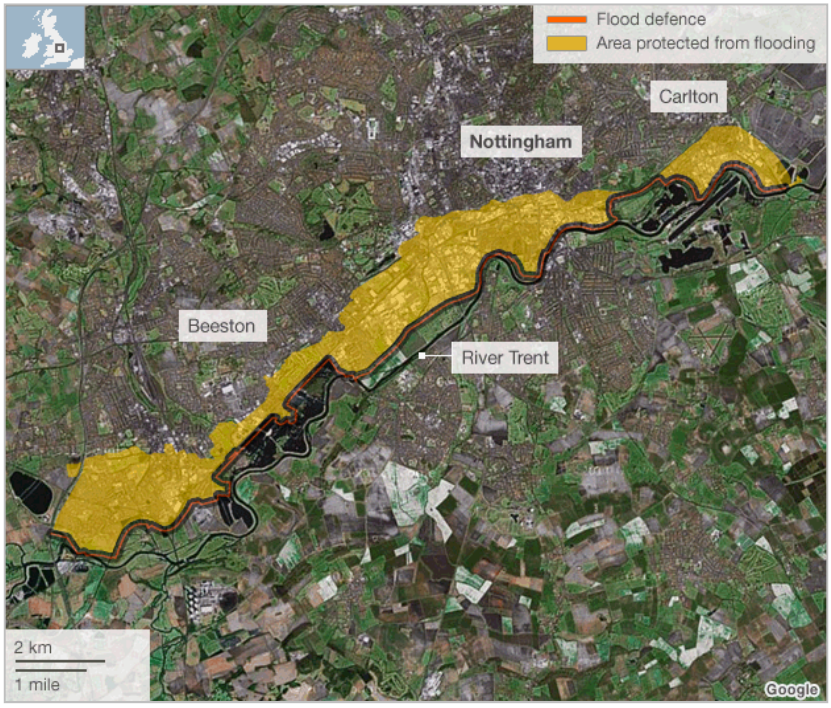
Figure 8.1 – Location Plan showing The Meadows, Green Street & extent of Left Bank Scheme



(Source: Ordnance Survey with Author's annotation, 2014[120])

[120] https://www.ordnancesurvey.co.uk/osmaps/

Figure 8.2 – Extent of Left Bank Scheme



(Source: BBC, 2012[121])

Figure 8.3 – Works to be completed at the Meadows for Left Bank Scheme

(Source: EA, 2008[122])

[121] http://www.bbc.co.uk/news/science-environment-20511267

Figure 8.4 – View of War Memorial and Flood Walls

(Source: Author's Photograph)

Figure 8.5– Flood Wall with gate, adjacent to Memorial Gardens

(Source: Author's Photograph)

[122] https://www.gov.uk/government/publications/nottingham-trent-left-bank-flood-alleviation-scheme

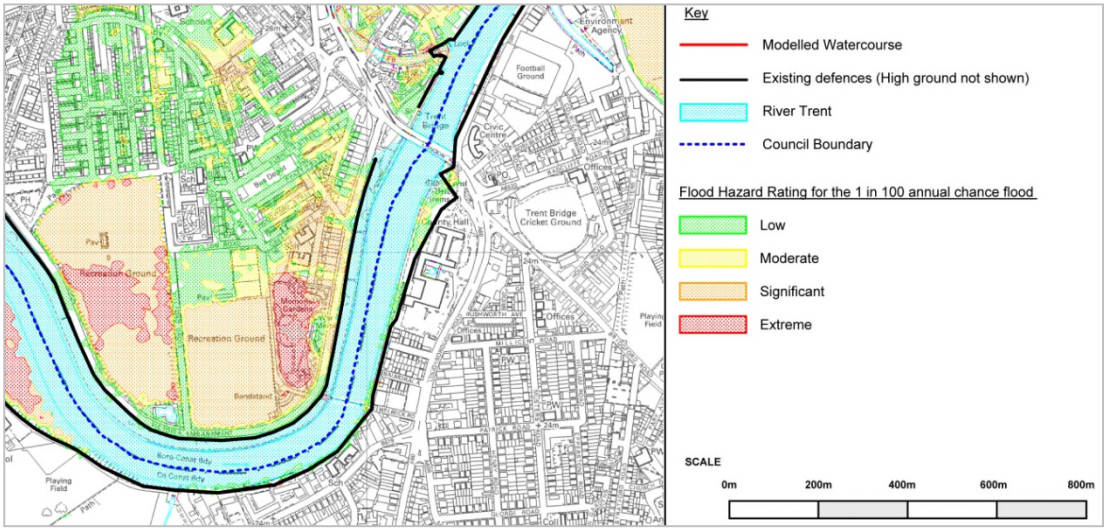
Figure 8.6 – View looking South toward river and flood mounds

(Source: Author's Photograph)

Figure 8.7– Victoria Embankment "promenade" shown from South of the river

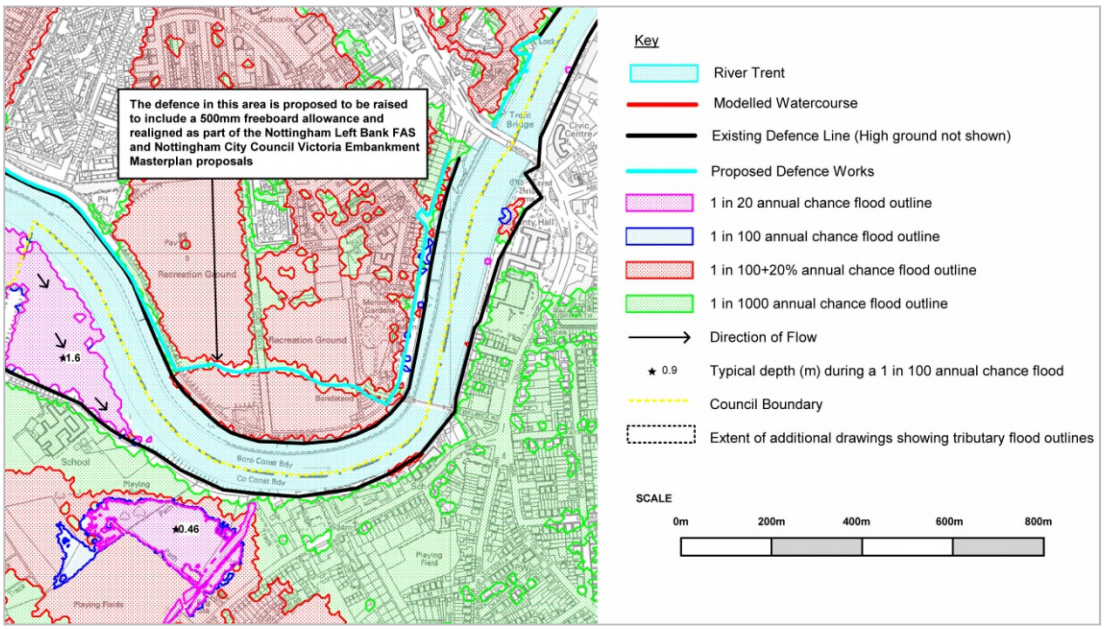
(Source: Author's Photograph)

Figure 8.8 – Flood Risk prior to completion of Left Bank Scheme



(Source: Black and Veatch, 2008[123])

Figure 8.9 – Flood Risk following completion of Left Bank Scheme



(Source: Black and Veatch, 2008[124])

[123] http://www.erewash.gov.uk/planning-building-control/planning-policy/core-strategy/core-strategy-examination/greater-nottingham-strategic-flood-risk-assessment.html
[124] http://www.erewash.gov.uk/planning-building-control/planning-policy/core-strategy/core-strategy-examination/greater-nottingham-strategic-flood-risk-assessment.html

In terms of the schemes impact upon flood risk, Figure 8.8 shows the hazard rating for the area in the event of a 1 in 100 year flood event, prior to construction of the defences, and illustrates that such an event would cause severe disruption within the Meadows, in particular the Green Street housing sites (see Figure 8.1) would see a moderate to extreme adverse impact. Following the completion of the Left Bank defences, as shown in Figure 8.9, the neighbourhood is protected against a 1 in 100 year event, plus an additional 20%.

Located within the Meadows, Green Street is an exemplar development of sustainable homes on the site of a former school, comprising 38 properties completed in 2012 and a second phase of 21 further homes begun in 2014; Figure 8.10 shows the redline boundary of Phase 1 and Phase 2 of the development, whilst Figure 8.11, shows a computer visualisation of the development (Nottingham city Council, 2011, 2013). The first phase of the development meets the Code for Sustainable Homes Level 4, and has been awarded the Building for Life Gold, as well as being commended by the Urban Design Awards. According to the developer, this focus on high-quality design and energy efficiency, has allowed them to charge a premium of 30% on top of typical market values, with all properties quickly sold from plan.

The developer BP, are a public-private partnership (PPP) who aim to produce outstanding regeneration projects, with commitments to quality and sustainability. These are reflected in the appearance of Green Street, with its contemporary, 'Urban Renaissance' style (see Chapter 2), which includes a high quality public realm with social spaces, paving and trees, as well as sustainability features, including roof

mounted photovoltaic panels, see Figures 8.12 and 8.13. However, the design is also contextual with the row layout and terraced typology of properties reflecting the surrounding Victorian streets; see Figures 8.14 and 8.15.

Even prior to construction, these details were well communicated by a planning pack that includes 'Lynchian' analysis of urban design principles with rich visuals and illustrative information that make it easily understandable by a wide range of stakeholders. Most notably, there are also a number of visualisations showing the scheme from the perspective of potential users (Figures 8.16); whilst not quite in the 'Cullen' style, they do demonstrate that this is a development setting designed for people.

However, the quality of the public realm, relationship with surrounding streets and overall appearance of the development is compromised by the decision to raise up the floor height and introduce a flood wall at street level; see Figure 8.17, 8.18 and 8.19. This was done at the request of the EA to act as flood mitigation, but by introducing walls and ramps, it precludes the informal, social interaction that the design provides elsewhere. This overly crude attempt at mitigation appears to retrofit a solution onto a totally incompatible design; ably demonstrating how risks need to be dealt with early in a project, rather than being added towards the end of the design process (Bosher, 2007; Coaffee and Bosher, 2008). These floodwalls are not included within Phase 2, see Figure 8.20; the story behind these features is explored in greater detail below. [125]

[125] There are other points of criticism that could be levelled against Green Street; the elevations of the buildings can at times appear too busy, utilising many materials that are new to the area and increasing costs in what was an apparently financially tight development. It is notable, that elevations

Figure 8.10 – Location Plan

(Source: Nottingham City Council – Planning application search, 2014[126])

Figure 8.11 –Computer Visualisation of Green Street phases 1 & 2

(Source: Nottingham City Council – Planning application search, 2014[127])

in the second phase are more restrained, perhaps reflecting that lessons have been learnt on what works within the context.

[126] http://publicaccess.nottinghamcity.gov.uk/online-applications/

Figure 8.12 – View South along Hunter Street

(Source: Author's Photograph)

Figure 8.13 – "Social Spaces" on Hunter Street

(Source: Author's Photograph)

[127] http://publicaccess.nottinghamcity.gov.uk/online-applications/

Figure 8.14 – View of Existing properties on Green Street

(Source: Author's Photograph)

Figure 8.15 – View North along Fraser Road

(Source: Author's Photograph)

Figure 8.16 – Computer Visualisation of view North through Hunter Street

(Source: Nottingham City Council – Planning application search, 2014[128])

Figure 8.17 – Details of flood wall on Green Street Phase 1

(Source: Author's Photograph)

[128] http://publicaccess.nottinghamcity.gov.uk/online-applications/

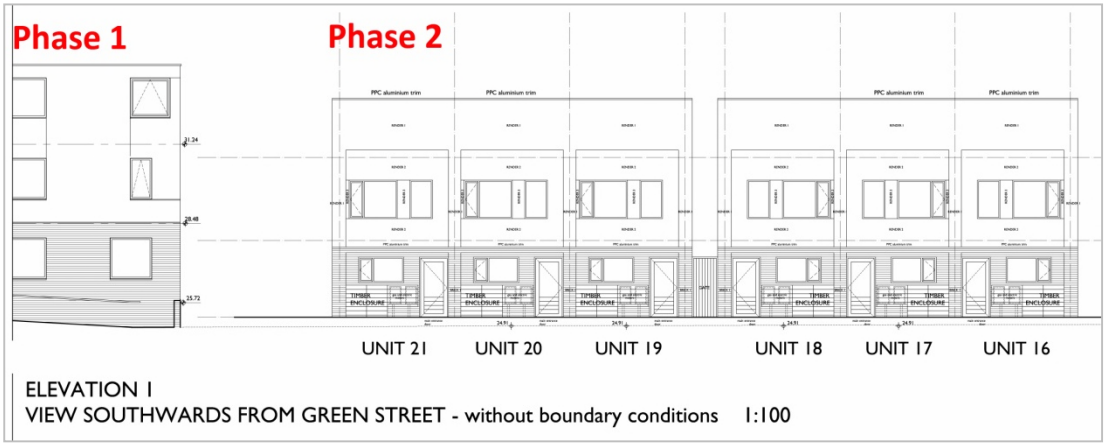
Figure 8.18 –Green Street Phase 1 with flood wall on left

(Source: Author's Photograph)

Figure 8.19 – Green Street Phase 1 flood wall

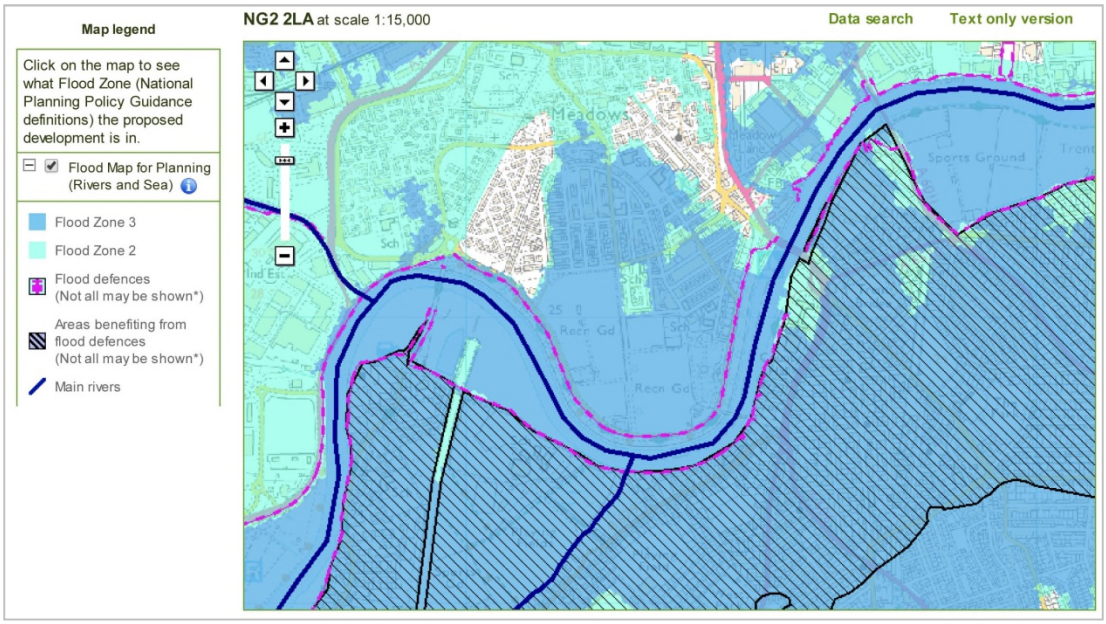
(Source: Author's Photograph)

Figure 8.20– Green Street Elevations for Phase 2



(Source: Nottingham City Council – Planning application search, 2014[129])

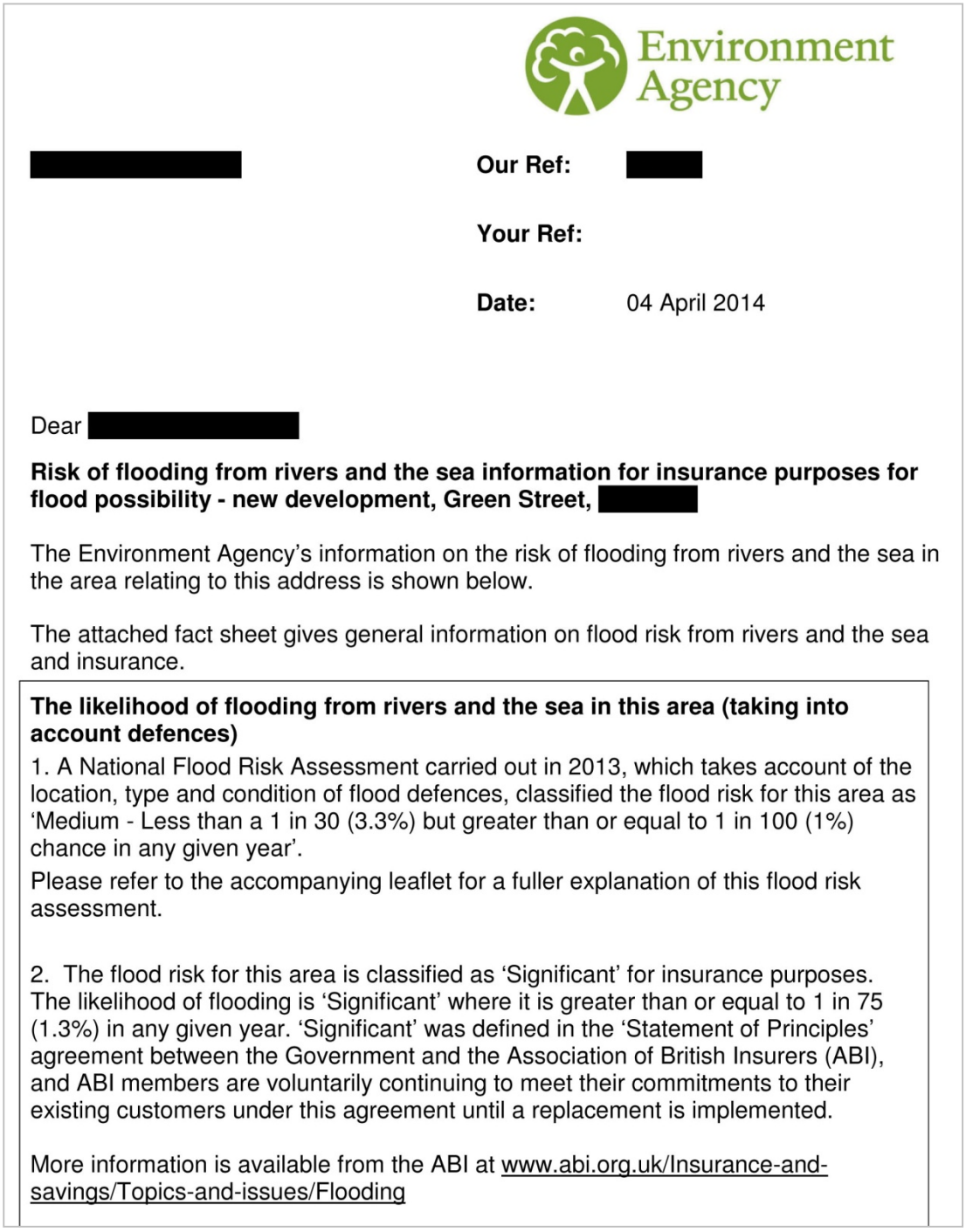
Figure 8.21 – Nottingham Flood Zones



(Source: EA, 2014[130])

[129] http://publicaccess.nottinghamcity.gov.uk/online-applications/
[130] http://apps.environment-agency.gov.uk/wiyby/37837.aspx

Figure 8.22 – Green Street Flood Risk Advice



Environment Agency

[redacted] **Our Ref:** [redacted]

Your Ref:

Date: 04 April 2014

Dear [redacted]

Risk of flooding from rivers and the sea information for insurance purposes for flood possibility - new development, Green Street, [redacted]

The Environment Agency's information on the risk of flooding from rivers and the sea in the area relating to this address is shown below.

The attached fact sheet gives general information on flood risk from rivers and the sea and insurance.

The likelihood of flooding from rivers and the sea in this area (taking into account defences)

1. A National Flood Risk Assessment carried out in 2013, which takes account of the location, type and condition of flood defences, classified the flood risk for this area as 'Medium - Less than a 1 in 30 (3.3%) but greater than or equal to 1 in 100 (1%) chance in any given year'.

Please refer to the accompanying leaflet for a fuller explanation of this flood risk assessment.

2. The flood risk for this area is classified as 'Significant' for insurance purposes. The likelihood of flooding is 'Significant' where it is greater than or equal to 1 in 75 (1.3%) in any given year. 'Significant' was defined in the 'Statement of Principles' agreement between the Government and the Association of British Insurers (ABI), and ABI members are voluntarily continuing to meet their commitments to their existing customers under this agreement until a replacement is implemented.

More information is available from the ABI at www.abi.org.uk/Insurance-and-savings/Topics-and-issues/Flooding

(Source: Provided to Author by Stakeholder)

This issue highlights the potential tensions between sustainability, development norms and the need to promote resilience, particularly when we are prioritising brownfield[131] land. Despite being partially publicly owned, the development needed to be profitable; something the developer acknowledged was "challenging" given the schemes incorporation of many innovative sustainability features. Further, with the late requirement for flood mitigation, the first phase was only viable with the injection of public "Kickstart[132]" funding. Whilst in line with best practice, the development process incorporated extensive public consultation[133], there is no green space provided and thus no SuDS.

Significantly, the development contributed substantial funds for improvements to the adjacent Memorial Gardens through a Section 106 agreement[134]. Furthermore, there is also a political undercurrent to Green Street; according to the scheme's architect there is a lack of high quality housing within Nottingham and consequently, many of the professionals who work in Nottingham actually live in the affluent suburbs of Rushcliffe Borough to the south. As a result there is political pressure for 'aspirational' development, like Green Street, to lure professionals back into the city.

From this initial review of the urban design and the development context, the following sub-sections will consider Green Street and the Left Bank Scheme from the

[131] Brownfield land is land that has been previously developed for another purpose and has long been championed as the most suitable location for development (UTF, 2007).
[132] Kickstart was an HCA funding initiative, aimed to fill the gap in projects that had started but were unable to complete following the credit crunch of 2008. https://www.homesandcommunities.co.uk/ourwork/kickstart
[133] Unusually for this sort of development, all designers and consultants employed on the development were local, with the architect living just a couple of streets away; meaning that they should understand the context well and had additional reason to see a successful outcome.
[134] Section 106 is a form of 'planning gain', now enshrined within the NPPF, where a development is allowed on condition that it makes some form of contribution, usually financial, towards public services.

perspective of the most relevant Design Weaknesses, which were identified within Chapter 6.

An Urban Planning Weakness occurs when there are failures in planning procedure or policy, particularly involving flawed consideration of specific vulnerabilities or risks in relation to a given land-use. For Green Street, the main policy reference is the Nottingham Local Plan 2005[135], which locates the development within the designated, "Primarily Residential Areas". Further, the available correspondence from the planning authority, including the officer's report and decision notice, were highly favourable and suggested that the development complied with all 14 of the relevant plan policies. These vary from the straightforward, NE12 – Derelict and Contaminated Land, which recommends the re-use of "brownfield" sites, particularly for housing, to the more vague, such as BE3 – Building Design, which recommends consideration of, *" the established scale, massing, rhythm and materials."*

In the case of NE10 – Water Quality and Flood Protection, which stated that "Planning permission will not be granted for development which would: d) be at risk of flooding itself"; the development seems to contradict this policy. Further, Phase 1 and Phase 2 of Green Street make very different accommodation for flood risk, reflecting the different governance powers and arrangements that are in place before and after the introduction of the NPPF.

The Meadows and Green Street are within Flood Zone 3a, indicating it is within the natural flood plain and thus the highest level of fluvial risk; see Figure 8.21. As the planning application for Phase 1 was prior to the completion of the Left Bank scheme

[135] Since this time a new Core Strategy has been adopted in September 2014.

and before the introduction of the NPPF, relevant flood policies were contained within PPS25 (DCLG, 2010), which required an application to the EA to apply a "sequential test" determining the suitability of the development; as such, this information is not within the public domain. The EA gave permission for the development on the condition that the finished floor level (FFL) was raised by 1m, which the developer felt was a disproportionate and unnecessary given that flood defences were going ahead. At such an advanced stage, having been designed in detail, it was adjudged that the only option left to the design team was effectively to retrofit flood walls to all buildings, greatly increasing the cost and making the scheme unviable without the additional funding. It is unclear why there was no prior discussion of flood mitigation, but the Left Bank Scheme subsequently was completed before Green Street; in the opinion of the developer, making the flood features redundant.

There was a general feeling amongst stakeholders interviewed that the raising of Phase 1 was an excessive measure; whilst this study concluded that flood walls had eroded the appearance and functionality of the public realm, it is unclear whether more appropriate flood measures could have been designed-in earlier in the development process.

For Phase 2, this issue was dealt with very differently; under the NPPF a 'sequential test' was still required, but it was decided by the LPA within the planning process, rather than the EA, and is therefore a publicly available document; see Figure 3.1 (Chapter 3) for the Sequential Test diagram.

As a residential development, Green Street phase 2 was identified as ‘more vulnerable’ and thus necessitated a further ‘Exception Test’. In practice, this required the developers to demonstrate how other potential sites were unsuitable for a similar development; e.g. too small or too large. Once this was proved, the development needed to show that it did not increase flood risk elsewhere and that it would have wider sustainability benefits to the community, in this case by providing ‘affordable housing’. Accordingly, the development was permitted with little mitigation.

Despite the development according with all local planning requirements, it is questionable whether mitigation measures were proportionate. An official EA flood risk assessment carried out on behalf of a prospective homebuyer for Phase 2 would appear to contradict planning decisions, suggesting that there is a ‘medium’ flood risk at Green Street Phase 2, which is “significant” for the purpose of insurance, see Figure 8.22. As these houses were completed after 2009, they would fall outside of the new Flood RE insurance system; see section 9.2 for further discussion.

In terms of whether there was a proportionate response to this risk, the Hazard Mitigation Weakness was characterised by inadequate measures to address a known hazard, often arising from flawed risk assessment processes. Planning conditions stipulating property level protection were met by a range of measures including, “well fitted, sealed doors and windows” and raised services, rather than personal flood protection measures. Similarly, there was little acknowledgement of surface

water flooding issues, which are 'designed out' in Phase 2 with underwater tanks.[136] Further, floor levels were set 500mm below those of Phase 1 and 300mm above a 1 in 100 year event with a breach in defences, which the scheme's drainage consultants suggested was only a *"remote likelihood".* Whilst the calculations behind these figures are very technical, and thus difficult to analyse[137], the assumption that shock events are unlikely was a critical failing of many of the incidents covered within Chapter 6, including Hurricane Katrina and Hurricane Sandy.

When an EA planning officer was asked about these measures, he seemed surprised at the low level of protection and implied that they had not been made aware of what was proposed; further demonstrating how responsibility is shifting away from technical flood specialists.[138] In particular he noted how there had been some recent flooding of properties further up the Trent, when the 1 in 200 year flood defences were overtopped.

Mitigation measures in both phases, where utilised, attempted to "design out" the flood risk, rather than find more appropriate ways to manage it. Furthermore, the risk management approach was unsophisticated and relied on quantitative measures, which as White (2013) notes are all too often wrong, to inform a binary approach of act/don't act on flood risk. This simplistic formula for mitigation overlooks the opportunities for enhancing community flood resources and

[136] Perhaps significantly, the schemes architect suggested that he believed the greatest risk presented by climate change was not flooding but overheating, which was mitigated by the development's position close to green space and the river.

[137] It was noted by stakeholders that local authorities lacked the expertise to thoroughly evaluate these figures and thus they had to be taken on trust.

[138] The officer was clearly a little uncomfortable talking about the project, and was aware there had been criticism of their handling of Phase 1, further indicating that the EA are under political pressure to not unduly delay the development process.

emergency plans. Moreover, weaknesses in Emergency Response and Stakeholder Involvement were characterised by inadequate consideration of potential barriers to the successful involvement of emergency procedures and responders, as well as a failure to engage the necessary stakeholders. Thus tellingly, whilst plans showing incident access and egress routes were included within the planning application, there was no effort to inform residents about what they should do in the event of a flood, and emergency planners were not involved in this involved process either.

More positively, the developers have retained an active involvement in the development, conducting post-occupancy surveys and monitoring the success of the design in operation.[139] Subsequent work to address defects has demonstrated how the long-term engagement of the developer is literally providing adaptive capacity. Similarly, the design of the buildings can be reconfigured by future generations, whilst energy efficiency innovations will make the scheme less reliant on vulnerable energy infrastructure. It is thus unfortunate that a design so outstanding in many ways, has addressed the risks of flooding in such a disjointed manner, compounded by the failures in local decision making processes.

When researching issues of Governance for the previous chapter, many stakeholders highlighted the Left Bank flood defences as being an exemplar scheme. However, looking more closely at the details it is apparent that there are limitations even here,

[139] These operational surveys indicated that the residents appreciated the design and energy saving features, but it was the location of Green Street, close to the centre of Nottingham, transport and the river, which they felt was its best feature. Of course, the location of Green Street is also one of significant vulnerability. Post-occupancy reviews also uncovered defects with the roofing design and the thermal performance of insulation. As of summer 2014, the roofs are being replaced and an investigation has identified failures in construction as the cause; with the roof, the main contractor did not follow the specification, whereas the insulation defect was caused by sloppy work which left gaps between insulation panels. The developer suggested that there is a lack of skills within the UK construction industry, with too much focus on cost over quality, compounded by the practice of experienced builders sub-contracting work to more inexperienced contractors.

such as the requirement to account for the impact of climate change. EA projections calculate that climate change will lead to a 10% increase in river flows by 2015 and 20% by 2025 (EA, 2005). Whilst the design can deal with a 1 in 100 year flood event with an additional 10% flow, it would be overtopped with such an event with an additional 20%. In effect, this design will only provide the required level of protection until a maximum of 2025, justified on cost and 'efficiency' grounds. It is assumed that further works will be required in the future, eroding adaptive capacity and demonstrating Fisher's (2012) conundrum with too much efficiency.

So whilst there is a clear link between ongoing place management and additional adaptive capacity, these examples also illustrate the tensions between sustainability and resilience; particularly around the cost of measures. Like sustainability, resilience potentially requires additional funds and new governance arrangements (Walker and Salt, 2011), but it appears possible to charge a premium for sustainability features, in a way that is not currently possible for resilience measures. However, the example also appears to suggest that urban design has addition value, in this case a contextual approach that offers additional benefits to the community, and offers a potential 'way in' for resilience measures. It could also be said that the example of sustainability offers potential lessons to resilience implementation; in this example, whilst innovation is critical, new approaches require ongoing review and an expectation that certain elements will not perform as expected.

More widely, this vignette demonstrates that even amongst the most enlightened developers, there is a culture of designing to meet the minimum standards, most notably around surface water; as White (2013), Punter (2007) and Moore (2012)

suggested. Similarly, neglecting to address issues earlier in the development of the design, as at Green Street, can itself be both costly and problematic (Coaffee and Bosher, 2007).

Finally, there is often a binary approach of do nothing or put in place physical measures which utilise built fabric to 'design out' risk, (although in truth, property level measures were not really utilised either) whilst the specialists dealing with flood risk appear to have had little input into the design of the development; flood risk has been siloed out. Educational or people-based approaches, which could have benefited the wider area, were overlooked.

8.3 RUSHCLIFFE DEVELOPMENT VIGNETTE

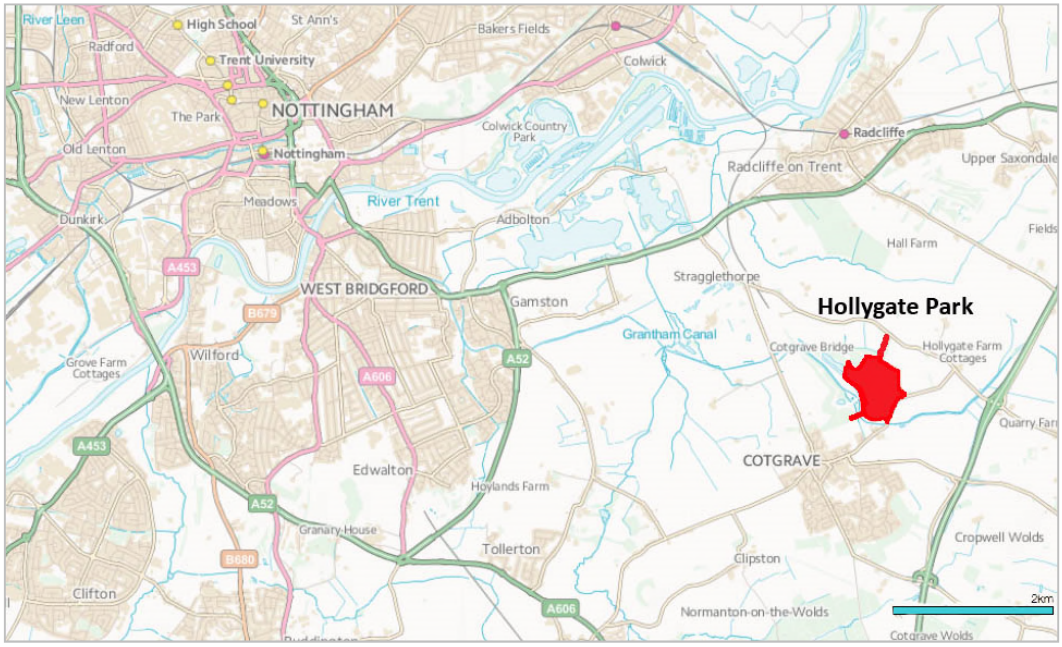
This micro case-study looks at a major residential development, located 6km to the southeast of Nottingham city centre, within the Borough of Rushcliffe; locations are shown on Figure 8.23 and 8.24.

Hollygate Park is a new development of 450 dwellings and associated infrastructure, on 34Ha of former colliery land, close to the village of Cotgrave. Following the closure of the colliery in 1995, much of the mine-workings were "reclaimed and re-graded" by the County Council as a Country Park, with a small area left for commercial or industrial redevelopment. After many years, with little interest in this sort of development, a 2008 application was made for 500 homes by the site's owners; a consortium of government regeneration agencies including English Partnerships, the East Midlands Development Agency and laterally the Homes and Communities Association (HCA).

The site's challenging context, including significant ecology, helps to explain its turbulent development history. Following the closure of the colliery, Cotgrave's population has declined from over 8,000 residents to around 7,300, and the area is noted for its social problems around crime and joblessness, which have been a major driver for development of the site. However, the area is close to the key commuter roads of the A46 and A52, and within an area of considerable housing demand. Following several years of consultation and negotiation, an outline application was approved in 2011, whilst in 2012 development plots were sold to a major volume house builder and in 2014 they received full planning permission following the discharge of reserved matters. At the time of writing, the site is in the early stages of construction.

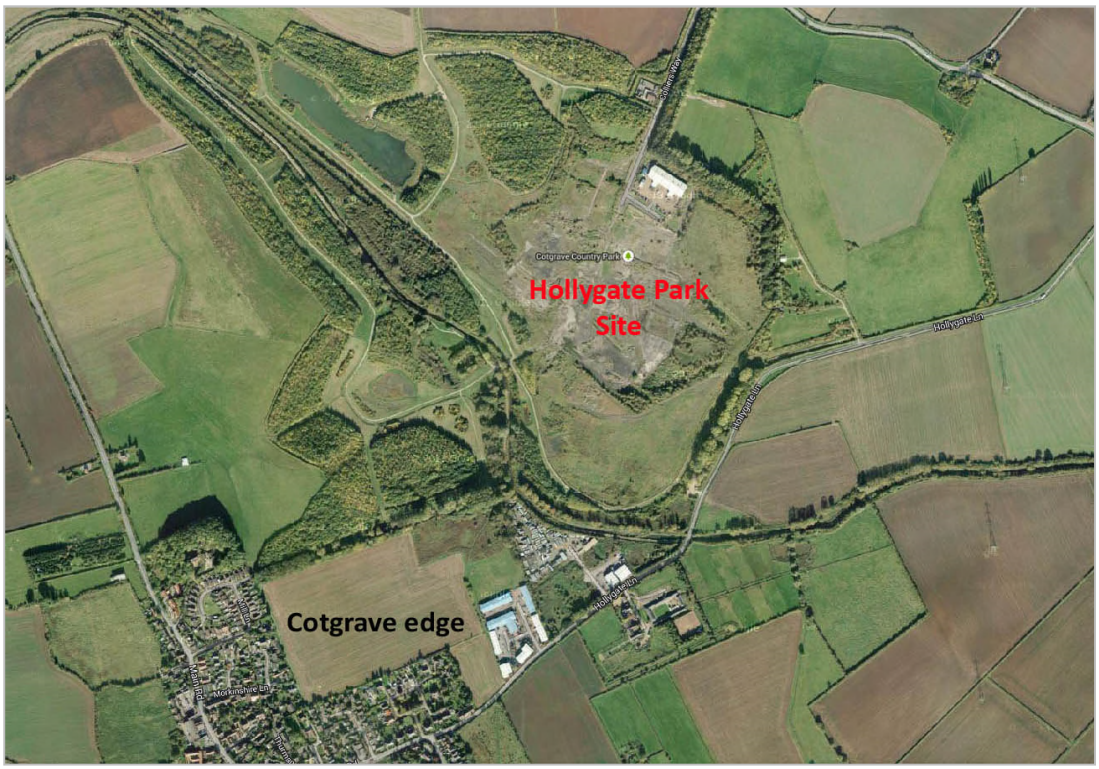
This long progression is reflected within the design itself, with some significant changes occurring between the original outline consent and the eventual detailed design. Perhaps more importantly, it also provides this study with a rich source of information on its development.

Figure 8.23 – Location Plan showing Hollygate Park, Nottingham & Cotgrave



(Source: Ordnance Survey with Author's annotation, 2014[140])

Figure 8.24 – Aerial Site Photograph



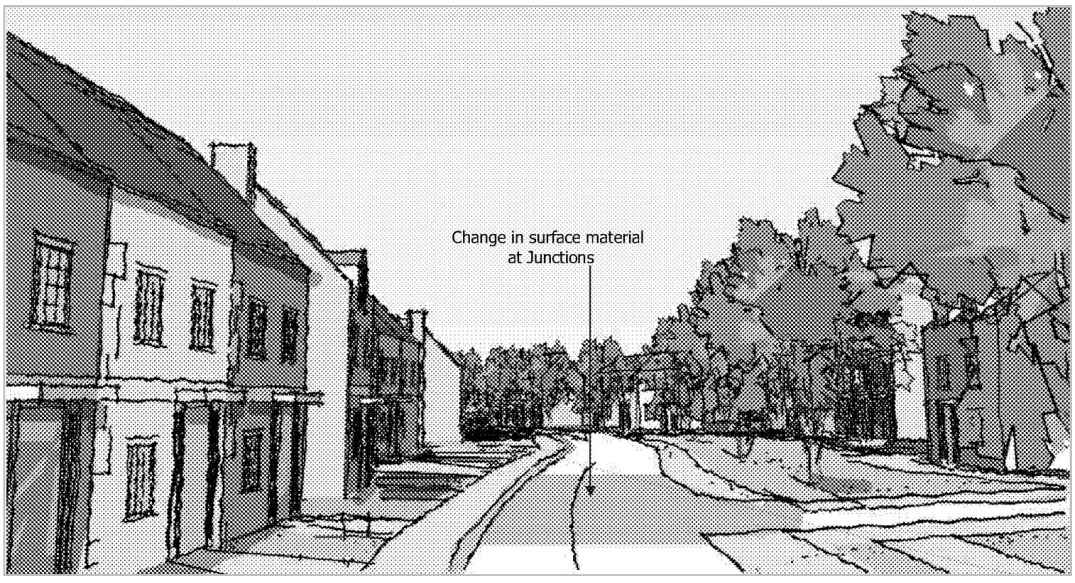
(Source: Google, 2014[141])

[140] https://www.ordnancesurvey.co.uk/osmaps/

Figure 8.25 – 2011 Masterplan

(Source: Rushcliffe Borough Council – planning application search, 2014[142])

Figure 8.26 – Illustrative 'Avenue' View



(Source: Rushcliffe Borough Council – planning application search, 2014[143])

[141]https://www.google.co.uk/maps/place/Cotgrave,+Nottingham,+Nottinghamshire+NG12/@52.9175525,-1.0395608,2529m/data=!3m1!1e3!4m2!3m1!1s0x4879c50692f696bf:0xe9ddb6e9223dcd79!6m1!1e1

[142] https://planningon-line.rushcliffe.gov.uk/online-applications/

Figure 8.27 – Cameo Study

(Source: Rushcliffe Borough Council – planning application search, 2014[144])

Figure 8.28 – Photo of adjacent Country Park

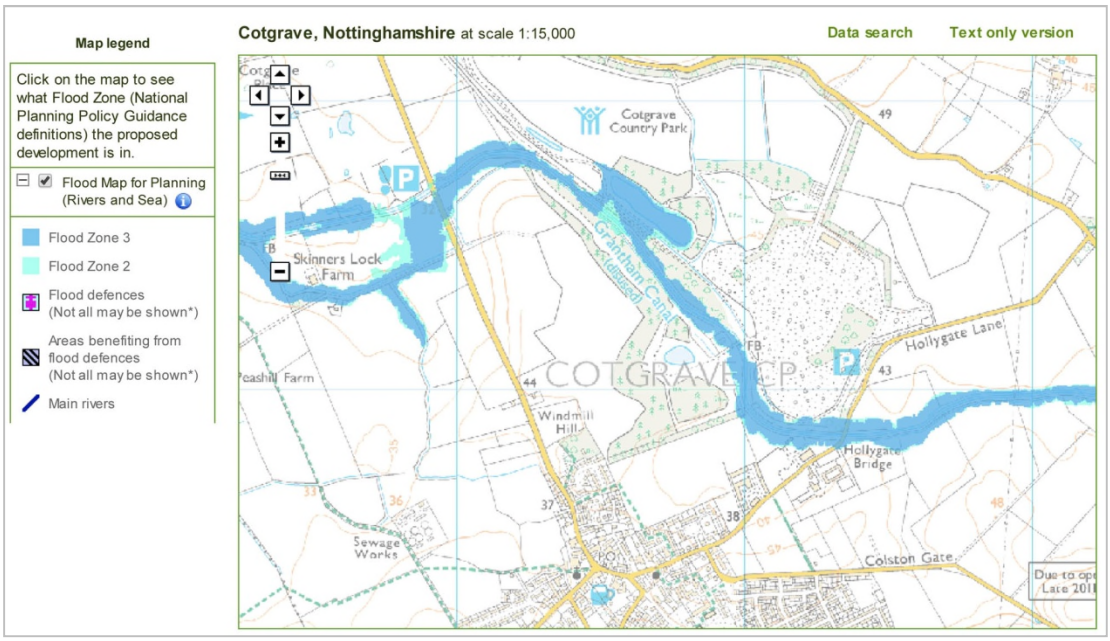
(Source: Author's Photograph)

[143] https://planningon-line.rushcliffe.gov.uk/online-applications/
[144] https://planningon-line.rushcliffe.gov.uk/online-applications/

Figure 8.29 – Photo of adjacent Country Park

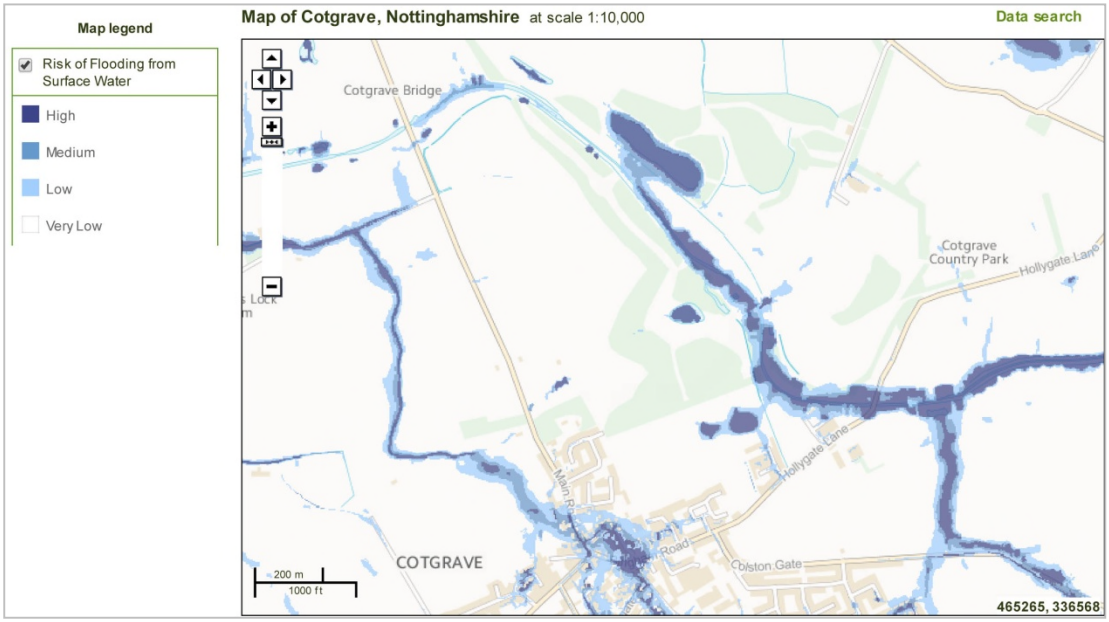
(Source: Author's Photograph)

Figure 8.30 – EA Flood Zones



(Source: EA, 2014)

Figure 8.31 – Pluvial Flood Risk



(Source: EA, 2014[145])

Figure 8.32 – 2014 Masterplan Diagram

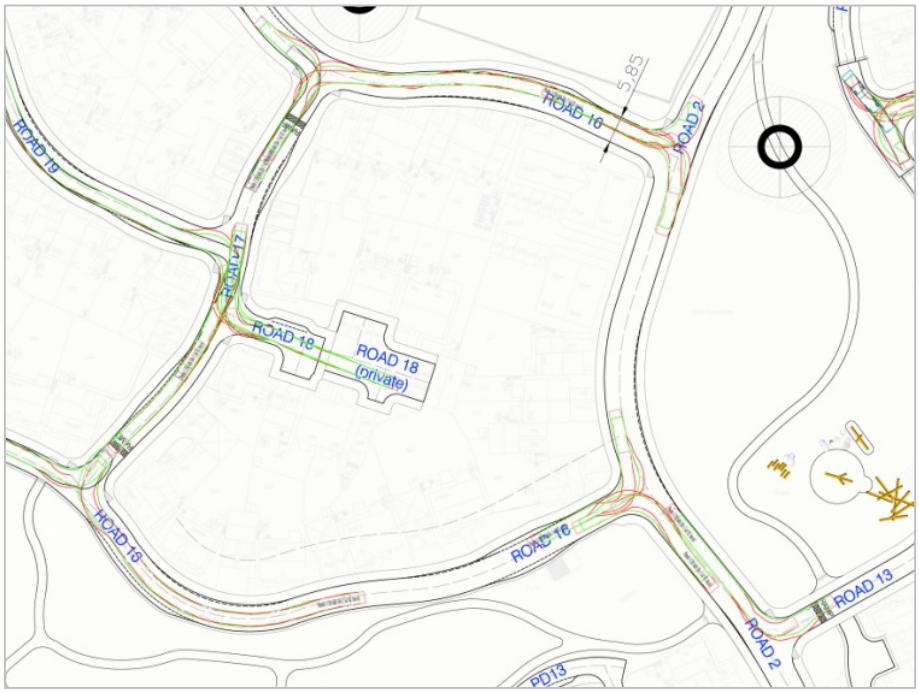
(Source: Rushcliffe Borough Council – planning application search, 2014[146])

[145] http://apps.environment-agency.gov.uk/wiyby/37837.aspx

Figure 8.33– 2011 and 2014 Masterplan Insets

(Source: Rushcliffe Borough Council – planning application search, 2014[147])

Figure 8.34 – Swept Path Analysis Plan



(Source: Rushcliffe Borough Council – planning application search, 2014[148])

[146] https://planningon-line.rushcliffe.gov.uk/online-applications/
[147] https://planningon-line.rushcliffe.gov.uk/online-applications/

The core of the 2011 application is a comprehensive urban and landscape design strategy, which is clearly described within the Design and Access Statement (Rushcliffe Borough Council, 2011). Perhaps surprisingly, the designers of this strategy did not feel they had utilised any particular guidance or design style, rather that the masterplan was a consolidation of what they had learned from practice over the years; as the partner of the 'integrated design practice' responsible for the design, GH, pointed out, *"I don't think there's an exact 'how to do' guide; it depends upon the site".* However, they did acknowledge the importance of good road design; utilising the latest guidance from "Manual for Streets" (MfS), which focuses on quality of place, rather than technical road standards.

This contextual approach is reflected in the design of the masterplan; see Figure 8.25. Further, these ideas are well communicated by a diverse range of visual material, supported by descriptive text which outlines the schemes "Vision" and design principles, including how the site will be broken down into a series of "Character Areas"; see Figures 8.26 and 8.27.

The site specific nature of the design extends to measures to integrate the housing with the surrounding country park, by drawing "fingers" of green infrastructure (GI) into the plots. Figure 8.35, shows how drainage and surface water flooding are a key part of the existing country park design. Accordingly, a key element of the proposal is a sustainable drainage system (SuDS), which uses features, such as ditches, swales and ponds, to address the drainage needs of a site, rather than a conventional system of pipes which can increase wider flood risk. This is relevant, because there is

[148] https://planningon-line.rushcliffe.gov.uk/online-applications/

significant flood risk within the Country Park, with areas of Flood Zone 2[149] and 3[150] associated with the disused Grantham Canal, immediately adjacent to the site; see Figure 8.30 for EA flood zones. Figure 8.29 shows the very close proximity of the canal to the development site (which can be seen behind the watercourse, between vegetation).

As at Green Street, the development has adopted a very binary approach to avoid mitigation; a land swap was undertaken with the Country Park to make sure that the housing was entirely located within Flood Zone 1, which would therefore not require significant flood mitigation, as well as to purchase an existing pond to use for surface water storage. This simplistic 'redlining' approach is an attempt to circumvent risk through spatial selection, but appears to overestimate the reliability of quantitative measures (White, 2013) and largely ignore the risk of surface water flooding.

Figure 8.31, shows the risk of pluvial flooding within the area; showing larger areas of associated high risk surface water flooding around the canal. Notably, the designers of the 2011 scheme seemed confused by the suggestion that the site had any sort of flood risk. However, the site's landowners the HCA appeared very aware of flood issues, with their planning manager, AB noting:

> *"We have to think about those 1 in a 100 year floods because they're not 1 in 100 years. Up in places like Hebden Bridge they are happening 3 times a*

[149] Zone 2 is defined within Planning Practice Guidance as "Medium Probability" and is described as "Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding"; see Figure 8.26 for acceptable developments.

[150] Zone 3 is defined within Planning Practice Guidance as "High Probability" or "The Functional Floodplain" and is described as "Land having a 1 in 100 or greater annual probability of river flooding;" or "This zone comprises land where water has to flow or be stored in times of flood." Flood maps do not differentiate between Flood Zone 3a and 3b, which indicates the flood plain with and without defences. See Figure 3.1 for acceptable developments.

year.... You can't be working in the built environment and not be aware of these issues, but you've also got to rely on other bodies."

Following outline permission in 2011, the site was sold with permission to a volume house builder and many of the design's principles began to change as the design was developed by the builder's in-house designers; as noted in Chapter 7, government agencies are under mounting pressure to deliver higher land receipts, rather than prioritising development quality. Figure 8.32 shows the updated 2014 masterplan, whilst Figures 8.33 show insets of the same areas from the 2011 and 2014 plans; as GH, the original designer of the application notes, *"It's a very different scheme."* In contrast to the symmetry and 'legible' views of the 2011 design, the 2014 layout has many more detached properties, haphazardly aligned around the much larger structure of roads. Similarly, plans submitted for planning in 2014 are much more technical, perhaps deliberately making the proposals more difficult to interpret (Rushcliffe Borough Council, 2014).[151] It was suggested that these changes were made to accommodate the house-builders standard units and standardised construction methods; however, as the contextual nature of the design was eroded, so too was the effectiveness of flood resilience measures.

Further research would uncover the significant influence of the upper-tier authority on the development of the design, whilst there is also a connection between road

[151] From this material, it is difficult to ascertain the relationships between individual buildings and the composition of street views. What is very apparent is the very wide variety of materials and finishes that are applied to houses, in contrast to the local character outlined within the original D&A. Furthermore, much of the information contained within this application is highly technical, with many drawings illustrating road tracking, drainage falls and building construction. It could be conjectured that by focusing on technical issues, with little explanation for the lay reader, it is harder for non-experts on drainage or building construction to question, and may disguise the implicit changes within the scheme. Further, that the very diverse palette of materials is an aid to disguise the uniformity of properties.

design and accommodation for water and flooding. The scheme's landowner outlined how under the Localism Act, it was increasingly down to local authorities to decide how to address flood risk, rather than the EA; he thus expressed his frustration at how the Upper-tier Authority had hampered flood mitigation by refusing to accept a SuDS based flood and drainage strategy:

> "The developer wants it, we want it as the landowner, the local planning authority want it, cos they think that's a good way of dealing with it, but the county doesn't want to receive it."

As noted in Chapter 4, since the 2010 Flood and Water Management Act came into force, surface water drainage is the responsibility of the upper-tier local authority; in this case Nottinghamshire County Council. Whilst it was not possible to speak to a county drainage officer, other stakeholders suggested that such an approach was either precluded by outdated guidance, or that it was not the preference of influential officers. More problematically, the County Council were only willing to adopt a conventional piped system, which AB suggested meant, "... whatever happens, we and the developer will have to get a trust involved to manage that (meaning the SuDS and ponds)."

As SuDS was a condition of Rushcliffe BC giving planning in 2011 (Condition 33), it has meant that the developer had to come to a very awkward compromise as a result of the County Council's unwillingness to adopt SuDS, with the approved scheme utilising two separate systems to deal with surface water. The development's roads and buildings use a traditional gulley system, feeding the water through pipes to an offsite 'attenuation' pond, which releases back into a

conventional sewage system and is maintained by the County Council. By contrast, other areas which include SuDS features, require additional private maintenance; by using elements such as permeable paving, ditches and swales to deal with water through infiltration back into the ground, this approach minimises run-off and thereby flooding. The developer was very critical of two-tier authorities and the 'siloed' mentality it promoted, suggesting that this separation of functions meant that officers had less motivation to work towards shared goals, and observing that other authorities are "more pragmatic." [152]

As previously highlighted, the 2014 scheme has a much larger network of roads, including wider turning radii and turning heads, see Figure 8.34 for technical inset; all of which are discouraged by the latest road guidance[153]. Like surface water, the road design is informed and approved by the upper-tier authority, Nottinghamshire County Council, who insist upon the use of the "6Cs Design Guide" for highway and road standards; amongst the features outlawed by this are 'homezones', identified within Chapter 3 as offering a range of other co-benefits (Clayden et al., 2006). In the opinion of PJ, a highway design expert and author of MfS, 6Cs guidance is a *"retrograde"* attempt to go back to the earlier approaches to road design, which focussed on maximum vehicle speeds rather than considerations of place, all through the enforcement of rigid, proscriptive standards; in his estimation, it is not suitable for application at a domestic scale. This appears to be an example of the 'rigidity trap' identified within Chapter 4 (Rogers, 2013).

[152] He also intimated that a lack of cooperation reflected local political tensions between authorities, citing how some Nottinghamshire authorities share plans and services, whereas they don't co-operate with other authorities run by different political parties.

[153] Manual for Streets (DoT, 2007) and Manual for Streets 2 (Chartered Institution of Highways and Transportation, 2010).

Significantly there is a synergy between maladaptation in road design, which impacts upon the wider urban design and quality of public spaces, and how surface water is mitigated; not only do larger roads generate more surface run-off, they require more space meaning there is potentially less space for SuDS, whilst rigid, quantitative drainage standards are difficult to apply to more natural approaches. Whilst the 2014 design includes some small areas of permeable paving, which can mitigate surface water problems, they are located within private areas as the 6 C's guidance precludes their use. Not only does this demonstrate how maladaptive approaches are often proscribed by outdated standards, but that the responsibility for these features are effectively, 'rescaled' to residents.

However, few of these issues, or the wider concerns around urban design described within this section, were discussed within the 2014 Officer's Report or the minutes of the planning committee, which decided the application. In fact there is no mention of urban design at all, which seems a strange omission.[154] On the 2014 design approach, the officer's report states:

> *"It is however considered that the Reserved Matter application is largely in accordance with the illustrative Masterplan of the outline application and therefore complies."*

The format of the report is divided up into comments by specialist officers on technical issues; critically there are no comments from an urban design officer, indicating that in all likelihood the Borough does not have one. There are comments from both the Borough and County landscape officers, but they are limited to the

[154] Although the scheme has apparently been through a design review, there is no information about the substance of this process.

plant species used within the development, which do not conform to the "limited palette of species" required by the Nottinghamshire Landscape Guidelines and are thus not acceptable. This seems very proscriptive and makes no reference to how these comments will impact upon the wider design of the scheme and the quality of spaces. Furthermore, it is a very siloed way of dealing with the 'transdiciplinary' issues of urban design, and it can only be speculated whether this failure to engage with the topic is cultural, political or simply the dearth of design skills, as Punter (2007) suggests.

The political pressures behind the development are hinted at in the minutes of both the 2011 and 2014 planning committee minutes; prior to the discussion of the scheme in 2011, the head planning officer "reminded" members of the shortfall of allocated housing within the borough, and the potential consequences for them not having a sufficient housing supply. Similarly, prior to the discussion of the 2014 application, one of the elected members stated on record: "The sooner the development can be started now that everything has been dealt with the better."[155]

However, more obviously significant are the economic processes which drive development. At Hollygate Park, the Section 106 agreement[156] states that over £3 million will be contributed by the developers towards local services, in addition to a variety of works carried out by the developers themselves on the country park,

[155] It is hard to quantify the political pressure for more local housing, but following changes in National Policy, which have seen a number of major housing applications come forward in the area against the wishes of the authority; it is clear that this is a factor

[156] A package of in-kind works and payments contributed by a developer in an attempt to make the development more attractive to local decision makers.

including the creation of a new foot bridge over the canal.[157] Given the massive sums of money involved, it seems unsurprising that the shortcomings of the development's design were overlooked.

The review of the design only identified one clear weakness in maintenance, which mirrored the Maintenance Weakness from Chapter 6, which was characterised by insufficient measures in place to maintain the built environment and ensure ongoing defects are addressed. By creating parallel surface water systems for the roads and green areas, and thus necessitating parallel maintenance regimes, this creates potential difficulties in providing maintenance continuity in the future. Similarly, by passing flood mitigation features to individual residents, it is uncertain whether they will be adequately looked after in perpetuity.

Elsewhere, a number of issues within the design which could be considered sub-optimal or displaying an 'every-day' maladaptation, as described within Chapter 6. Accordingly, whilst from an Urban Planning and Hazard Mitigation perspective there are features within the design that address the sites vulnerability to riverine and surface water flooding, it is apparent that more could have been done. Similarly, the Architectural Design dictated by road alignments both reduces the usable quality of spaces, but most critically eroded measures to address surface water drainage.

[157] The largest of these contributions were: £932,450 for Community Provision to be spent on local facilities and possibly a new shopping centre in Cotgrave, £763,200 for Education Contribution to go towards building a new school and £600,000 Bus Services Contribution, to guarantee bus services between the centre of Cotgrave and Nottingham.

Finally, it was suggested that some of the consultation with local stakeholders was superficial.[158]

Despite this, the development has recently been accredited by Building for Life 12, an industry assessment scheme to promote good residential design, which uses scoring in 12 areas for "weeding out poor design" (Design for homes, 2014).[159] Moreover, there is a sense that the major stakeholders wanted to make a success of the scheme, but found it difficult to divert from their own "locked-in" development practices. This highlights how cultural and professional norms need to be overcome to promote a more resilient built environment.

Accordingly, whilst the development includes some adaptive features, such as the SuDS and GI, it also highlights a number of maladaptive practices and normalizing influences amongst both private developers and local governance arrangements; both of whom appear 'locked-in' to particular approaches. Furthermore, in times of austerity, there can be short-term cost benefits in adopting standardised approaches; for a private developer, it offers a cost saving on design services and potentially greater cost certainty, whilst within local authorities, proscriptive, hard standards can be more easily enforced and require less skilled time to administer. However, in both cases they are likely to stifle the innovation, contextual design and adaptive capacity needed for enhanced resilience. As in the cases outlined in

[158] Whilst there was extensive public consultation, most notably with a "planning in action" event organised in 2010 by Planning Aid England, the designers involved were rather cynical and felt that the process was more about convincing locals to accept larger scale development in return for greater investment in local services, than necessarily engaging them with the design.

[159] The design was also accredited by "Secure by Design", although the developer felt that this was a "tick-boxing exercise."

Chapter 6, it is most often a failure to change that is the greatest failing within built environment practices.

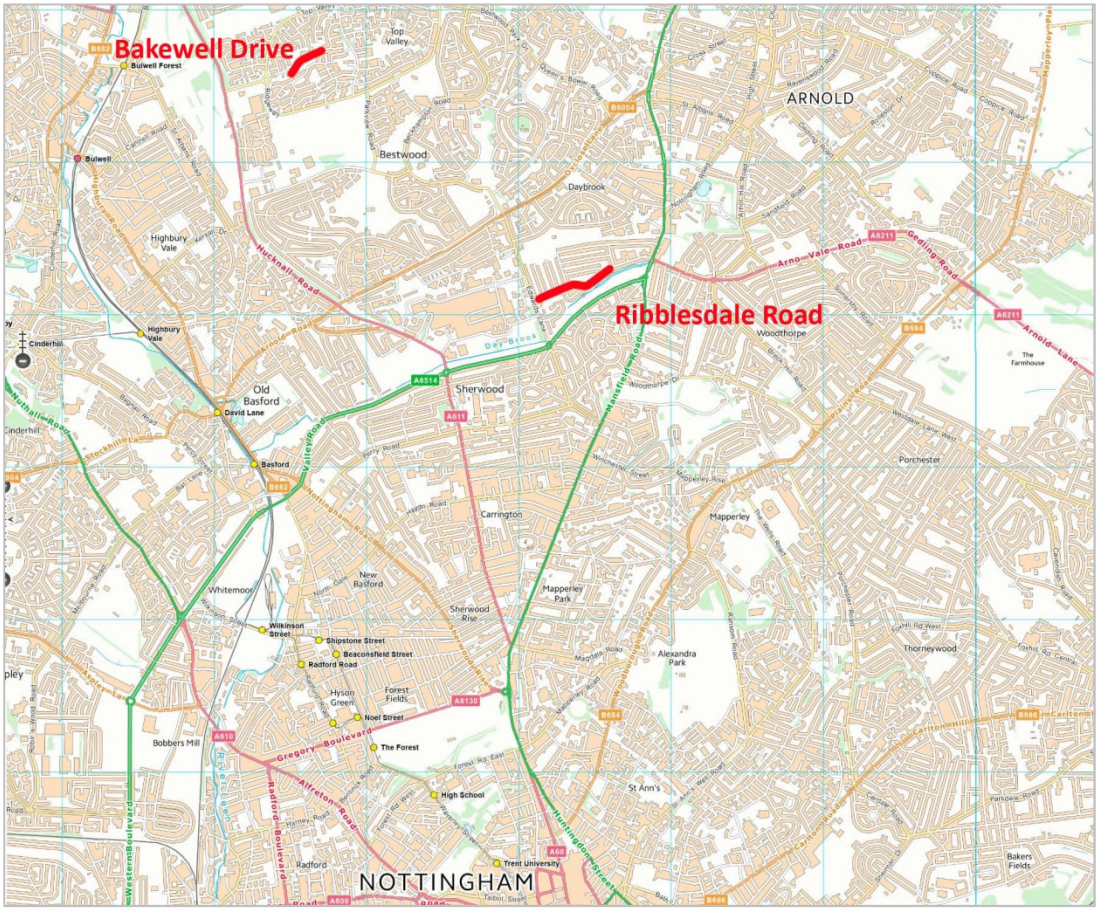
In summary, the case demonstrates how all stakeholders need to buy into a particular approach if it is to be successful, but that this is often difficult given 'siloed' roles within the decision making process. Similarly, some of the shortcomings might have been overcome by greater design skills and understanding of flood risk management amongst decision-makers, although once again there are also political and economic pressures at work, as responsibility for flooding is moved away from technical experts. It was also noticeable that the design quality appeared to erode following the departure of an experienced lead designer, echoing the point made in the previous chapter, that good designers tend to produce good design. However, perhaps the critical learning point is how resilience is also dependent upon ongoing site management and maintenance, which is often overlooked or difficult to make accommodation for, in current planning and development practices.

8.2 SURFACE WATER FLOODING VIGNETTE

This micro, case-study considers two examples within the residential suburbs of North Nottingham, reflecting upon how they have dealt with surface water flooding; in the case of Bakewell Drive, it is the failure to do so, whereas Ribblesdale Road offers a potential way of addressing this hazard through urban design intervention. Figure 8.35, shows the location of both sites.

Bakewell Drive is an infill development of 114 residential properties, which received planning permission in 2005 and is built on the site of former council flats and an adjacent school's playing field within an area of dramatic, steeply sloping topography, known as Top Valley (Nottingham City Council, 2006). Whilst the majority of houses were built for a local housing association, some were made available for general sale, with Land Registry records indicating these properties were sold in phases between 2009 and 2012.

Figure 8.35 – Location Plan showing Bakewell Drive and Ribblesdale Road



(Source: Ordnance Survey with Author's annotation, 2014[160])

[160] https://www.ordnancesurvey.co.uk/osmaps/

Figure 8.36 – Bakewell Drive Masterplan Inset

(Source: Nottingham City Council – Planning application search, 2014[161])

Figure 8.37 – Photo of Flash Flooding – 23rd July 2013

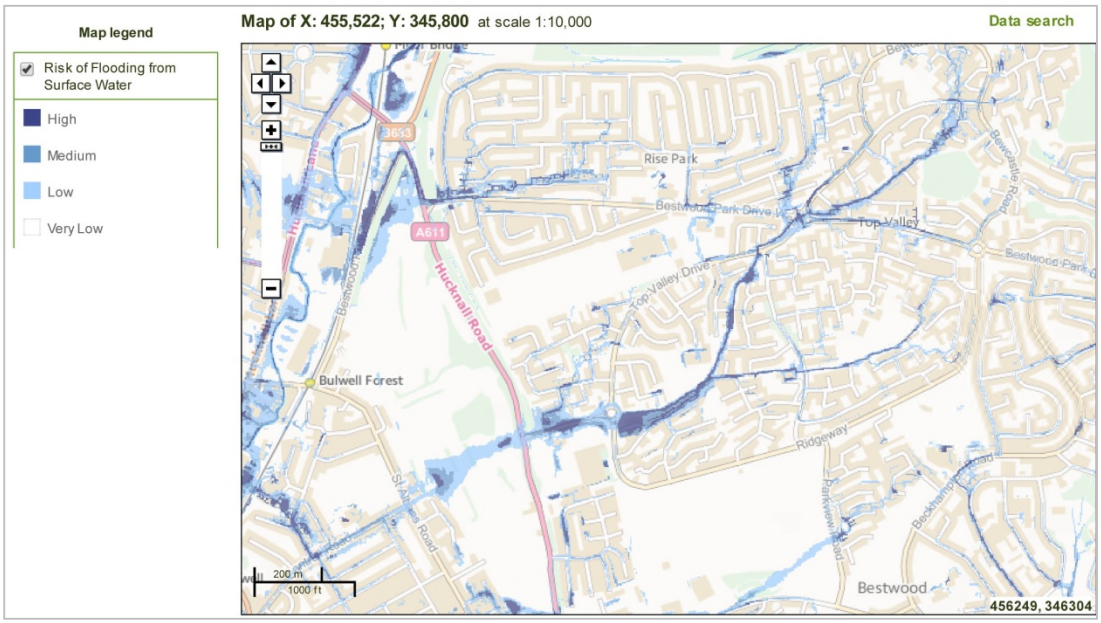
(Source: Mirror, 2013[162])

[161] http://publicaccess.nottinghamcity.gov.uk/online-applications/
[162] http://www.mirror.co.uk/news/uk-news/uk-weather-heatwave-end-thunderstorms-2094094

Figure 8.38 – Bakewell Drive Photo

(Source: Author's Photograph)

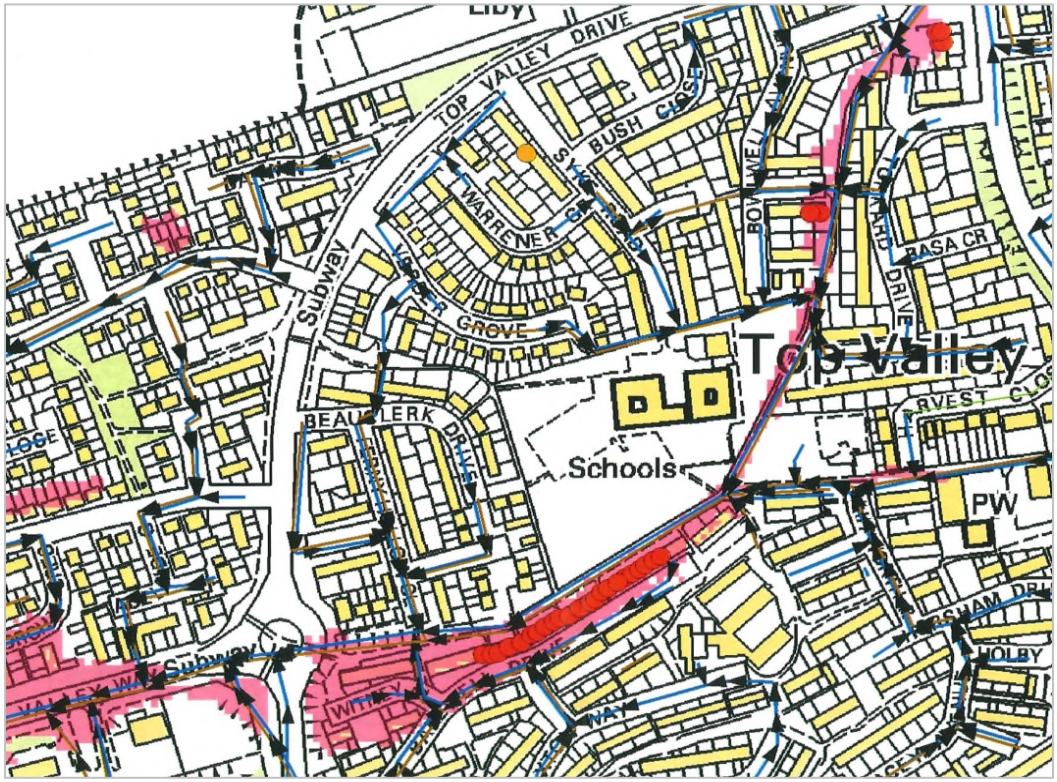
Figure 8.39 – EA Pluvial Flood Risk for Top Valley Area



(Source: EA, 2014[163])

[163] http://apps.environment-agency.gov.uk/wiyby/37837.aspx

Figure 8.40– Locations of Flooded Properties and EA Surface Water Flood Data



(Source: Provided by Nottingham City Council Officer, 2013)

Figure 8.41 – View from Bakewell Drive south towards Barnes Road

(Source: Author's Photograph)

Figure 8.42 – View east along Bakewell Drive, looking at properties on south side

(Source: Author's Photograph)

The development's design and access statement suggests one rationale for the development was to address security problems caused by the 'Radburn' design of previous housing, which had led to an *"area stigmatised by crime and anti-social behaviour"*. Accordingly, the new development was based on principles of a 'Secured by Design' approach; see Figures 8.36 for plan inset. Otherwise, the street scene is 'legible' by virtue of its formal layout and exhibits more variety, continuity and detailing than surrounding properties, which are drab and shabby in appearance, with little variation in form and finish; see Figure 8.38. It could be speculated that the apparent emptiness of the public realm, is an attempt to maintain open views and passive surveillance, or alternatively a lack of design input. By contrast, the area surrounding Bakewell Drive is very built up, dense and confusing to navigate, with

many dead-ends and cul-de-sacs; it successfully illustrates why permeability is so often cited as important within urban design guidance.

On 23rd July 2013, following heavy rain, many parts of Nottingham experienced flash flooding (Nottingham Post, 2013; BBC, 2013); see Figure 8.37 for photograph of flooding at nearby Southall. In total, over 100 domestic properties and 30 commercial premises were flooded and many more experienced external flooding. The City Flood Manager described it as an example of *"integrated flooding",* where *"surface water can't go anywhere because the drains are full, and the drains are discharging into the river, which affects everything."* Given the number of stakeholders involved in attempting to determine the causes, including householders, insurance companies, the EA, the local water company, housing developers and led by the City Council, it is perhaps unsurprising that the initial investigation took nearly six months. Of the 100 properties that were affected within the City, 31 of them were new properties on Bakewell Drive.

Figure 8.40 shows a red dot for every property which experienced flooding that day; using GIS software this was overlaid with EA data, showing possible locations for surface water flooding. Given this close correlation it begs the question of whether this incident could have been avoided and thus whether it highlights a Design Weakness?

The Decision Notice for the development, dated 22.07.07, confirms that the development met all the necessary policies including, CD1 – design in context, BE2 – layout and community safety and BE5 – enhanced landscape design. However, there is no mention of flooding and in particular surface water flooding; Nottingham City

Council Policy BE4 requires *"appropriate techniques to minimise the impact of surface water discharges*", which in this instance appears to have been overlooked.

The City Flood Manager (FM) suggested that the planners may not have had the surface water dataset available to them, whilst this information was generally understood to be insufficiently accurate to meet the *"quasi-legal"* requirements of planning. However, in terms of whether there have been mistakes made from a planning perspective, FM pointedly commented,"*just look at the topography!"* The very steeply sloping aspect of the development, as illustrated by Figure 8.41, combined with areas of hard surface creates additional surface water flow in the event of heavy rain. As noted for the Green Street example, the Urban Planning Weakness is the result of failures in planning procedure or policy, particularly around the appropriateness of a proposed use; given this, it is adjudged that this development displays an Urban Planning Design Weakness.

In 2014 the surface water dataset was updated by the EA with the claim that this information is now robust enough to inform planning applications. However, the flood manager indicated that whilst they would likely use it to advise applicants on surface water, they were sceptical that it could be used as grounds to reject a planning application, "how would it stand up in an appeal?" Several stakeholders observed how developers try to 'wriggle out' of providing mitigation, with some engineers marketing their record of bypassing planning and flood requirements.

Furthermore, it was suggested that with no watercourses nearby, the EA might not have been consulted. Thus when investigators spoke to residents they were told that the area had often flooded in the past; highlighting the value of local, contextual

knowledge held by the community. Failure to engage with key stakeholders was the key aspect of the Stakeholder Involvement Weakness; given that it is not possible to ascertain the substance of any involvement, this example should be considered as an every-day maladaptation of Stakeholder Involvement.

A site visit also made plain an Architectural Design Weakness, which is defined by built environment elements which fail to address potential vulnerabilities or site-specific landuse requirement; Figures 8.48 and 8.42 illustrate how the finished floor level (FFL) of the houses on the north side of Bakewell Drive are well below the level of the road, meaning that once the road became inundated with water, flooding of these properties was inevitable.[164]

Further, there is no public or green space provided within the development and thus no SuDS, which could have mitigated the problem. As with Green Street, the developers have contributed £165,000 through a Section 106 agreement to be spent on existing Council green spaces. This absence of appropriate features to address surface water flood risk highlights a failure in the design's risk management and thus a Hazard Mitigation Design Weakness.

In stark contrast, developments at Ribblesdale Road attempt to address the issue of surface water flooding utilising a retrofit of an existing residential area.[165] The gestation of the project is also atypical, having been brought forward by a local environmental charity (GW), rather than the local authority or organisations with responsibility for flooding.

[164] Notably, none of the properties on the opposite side of the road flooded, as their FFL was above the carriageway height.
[165] At the time of writing, this project is the only known example of a retrofitted rain garden in the UK.

Ribblesdale Road is a suburban residential street in Nottingham, adjacent to the north bank of the Day Brook. Stakeholders noted that the Day Brook was particularly prone to sudden flash flood events, which happen with little warning and threaten up to 972 homes in Old Basford. The 2008 Strategic Flood Risk Assessment of the River Leen and Day Brook (EA, 2008), highlighted these issues and the:

> *"…significant challenges facing developers in mitigating against this flood risk within their individual development sites."*

This study also noted the limitations of sewers in the area around Ribblesdale Road. Moreover, this report was the spur for GW to look at options for "managing surface water catchment" further upstream, and where the rain garden's concept emerged. The different stakeholders all provided slightly different accounts of the projects gestation, but once GW had produced an idea of how the scheme would function, they quickly had *"buy in"* from the EA and the local water company (ST), who were the primary funders. By contrast, the Local Authority took more convincing; as a result of concerns around the cost and ease of maintenance, as well as the lack of similar projects in the UK. Accordingly, the project team produced a detailed maintenance programme which demonstrated that it would actually reduce maintenance costs (Susdrain, 2013). Further, the political support of the local councillor was identified as critical in convincing officers to go ahead with the scheme, which was completed under a highway works order, rather than requiring planning permission.

The Ribblesdale Road scheme, confusingly also known locally as "Green Streets", comprises of 21 linear rain gardens which provide storage for rain water and surface

run-off. The designs comprise of aggregate filled voids, with a recessed area of planting on the surface, chosen to filter polluted run-off water, minimise maintenance and provide aesthetic interest; see Figure 8.43 for plan of development and 8.44 to 8.46 for photographs of finished scheme.

In contrast to the rather sterile public realm of Bakewell Drive, the rain gardens provide greater visual interest and diversity to the street-scene. However, the rationale for the funding of the scheme was neither about the appearance nor addressing flood risk, instead it was funded by the EA's Midlands Urban Rivers Community Initiative (MURCI Waters), to improve water quality in the Day Brook by intercepting the first flush of polluted highway run-off. Accordingly, the rain gardens have been designed to manage surface water run-off from a 1 in 30 year event, whilst the existing highway drainage gullies have been retained at the request of the City Highways team to allow for overflow once the gardens reach capacity. In terms of their performance, initial testing has indicated that the gardens are only able to deal with run-off from a 1 in 20 year event, as onsite works were hampered by unexpected services in the location of rain gardens, which meant they were unable to provide the anticipated capacity. Initial testing by ST has indicated that the scheme has reduced the flow reaching the sewer by 33% during a 1 in 1 return period storm; see Figure 8.47. However, stakeholders were in unison that whilst the rain gardens represented a step in the right direction, this sort of small retrofit would have a limited impact upon the wider flooding problem.

Perhaps most significantly, the rain gardens required a cultural change amongst highway officers at the city council; as the schemes designer, PC, noted, "highways

know their stuff around highways development... but they don't tend to look outside that silo. In effect the rain gardens are a test case, which has been publicised by water management organisations as an exemplar scheme (Susdrain, 2013). However, by retaining the existing road gulleys it ensured that the scheme wouldn't affect the roads conventional drainage system, but in doing so it also limited their capacity to reduce flooding.

Figure 8.43 – Rain Garden Layout Plan

(Source: Susdrain, 2013[166])

[166] http://www.susdrain.org/case-studies/case_studies/nottingham_greening_streets_retrofit_rain_garden_project.html

Figure 8.44 – Ribblesdale Road Photo

(Source: Author's Photograph)

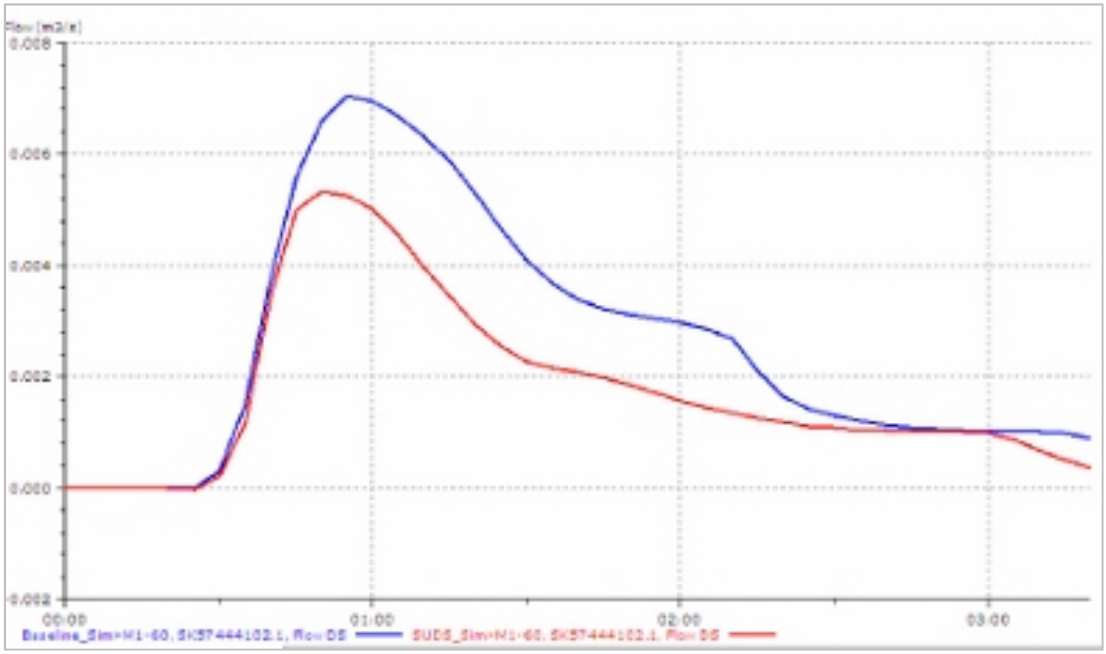
Figure 8.45– Ribblesdale Road Photo

(Source: Author's Photograph)

Figure 8.46 – Ribblesdale Road Photo

(Source: Author's Photograph)

Figure 8.47 – Graph of Flow into Sewer before & after installation of Rain Gardens



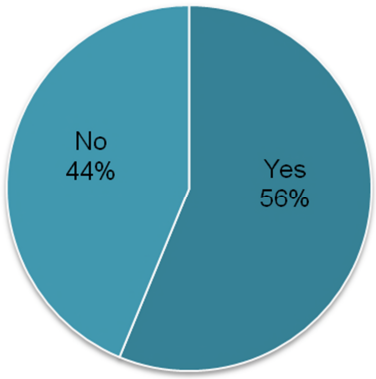
(Source: Susdrain, 2013[167])

[167] http://www.susdrain.org/case-studies/case_studies/nottingham_greening_streets_retrofit_rain_garden_project.html

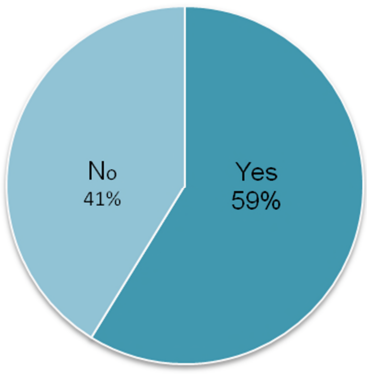
Figure 8.48 – Outcomes of Residents post-completion Survey

Please rate the rain gardens in terms of the change to the look of the street:

Would you like to see rain gardens rolled out to other roads in the area?



Has the scheme helped you to understand the connection between the road, the drainage system and the Day Brook?



(Source: Susdrain, 2013[168])

[168] http://www.susdrain.org/case-studies/case_studies/nottingham_greening_streets_retrofit_rain_garden_project.html

Unusually, the designers incorporated ongoing discussion with residents into the design process, which yielded important local knowledge, such as the fact that the road typically flooded at least once a year and which the council were previously unaware of. As a result of this ongoing work, the approach produced very detailed post-completion feedback from residents; Figure 8.48. However, the designers noted that this sort of approach was often difficult, time intensive and that a significant proportion of those involved weren't happy with the final outcome.

Perhaps most significantly, this feedback did demonstrate how the process of developing the design had educated the residents about the mechanisms of local flooding. This in turn will give the community additional coping and adaptive capacity against future flood events. Similarly, as a result of their work on the rain gardens, the City Highways team are now experienced at maintaining these sorts of facilities and can ask developers to provide something similar, again building adaptive capacity.

This ongoing engagement and learning echoes the outcomes of the review of urban incidents in Chapter 6, which noted the importance of operation phases for enhancing resilience. Whilst retrofitting is not typically recognised as being part of conventional urban design, Carmona (2014) suggests that ongoing interventions are of equal import, which the interventions at Ribblesdale Road would appear to substantiate.

By contrast, the development at Bakewell Drive has been shown to be maladaptive, in its failure to mitigate against local hazards and vulnerabilities or change development norms accordingly. More widely as the flood manager noted, the

process of planning for flooding is “too hung up on lines on plans” and quantitative measures; suggesting that she knows of many areas that have flooded which aren’t identified as vulnerable on flood maps. In evidence of this there are conflicting figures about the Nottingham flash flood event, with a local rain gauge at Bulwell suggesting a 1 in 36 year rain event, whilst the Met Office at Calverton suggested it was a 1 in 70 year event. However, the EA surface water dataset suggested that the properties in Cotgrave should only flood in the event of a 1 in 200 year event. These figures are too simplistic to address the complex nature of flooding; the flaw in all of these measures for river, surface water and sewer flooding, is that they are modelled in isolation and do not consider the collective impact of ‘integrated flooding’. From this example, it can also be inferred that existing governance arrangements are too fragmented to address flooding in a holistic manner.

Finally, it is unclear what remedial action is being taken at Bakewell Drive; this is complicated by the initial conclusion that the source of flooding was both sewer and surface water, which are the responsibility of different stakeholders and who may wish to address this problem in different ways.[169] The water company use a cost benefit analysis to inform the strategy, and they indicated that they will likely look to fund property level protections, such as flood resistant doors and windows, rather than providing additional sewer capacity. Given this, it can only be speculated whether the area will be vulnerable to future flood events. Moreover, it is unclear whether this incident has impacted upon house prices[170] or property insurance. Not

[169] Given the potential for litigation in this case, it is not too surprising that some of the key stakeholders involved were unwilling to discuss the failings of this scheme or the resultant impact.
[170] At the time of writing, none of these properties have sold since the event, which may suggest that the flooding has detrimentally affected property prices.

only is there potential for higher premiums, but whilst this incident would currently be covered by existing flood insurance, under the new Flood RE arrangement these properties would not be. More widely all properties constructed after 2009 will not be covered by flood insurance in the future, indicating a vital imperative to improve the way flood vulnerabilities are addressed. From the evidence of these cases, this does not appear to be happening and it poses a significant risk to future communities

As with other cases, the issue of surface water highlights how over-simplistic risk management practices often overlook significant risks and vulnerabilities. Further, they also illustrate that whilst measures for addressing surface water flood risk exist, entrenched practices and 'institutional inertia' often preclude new ways of addressing these risks. Whilst SuDS and rain gardens can have wider benefits, it requires stakeholders to look outside professional boundaries and siloes, to identify these opportunities. In particular, there are benefits to both urban design and potential flood resilience from ongoing community engagement, as well as enhancing stakeholder education. Finally, new governance arrangements are needed to promote integration and collaboration, which mirrors the integrated nature of flooding itself.

8.5 CONCLUSIONS

As a means to conclude on the lessons that can be drawn from this empirical data analysis, it seems appropriate to use the lens of "resilient urbanism", which was outlined in Chapter 4. Accordingly, it is suggested that resilient urbanism is promoted through three stages:

- Risk Management,
- Addressing Maladaptation,
- Building adaptive and resilience capacity.

Literature reviews (Scott, 2013; White, 2010, 2013) indicated that best practice approaches for dealing with flood risk were shifting from one of trying to 'design out' the hazard, to a more holistic and pragmatic method of flood management. Whilst this may well be the case within more specialist fields, from the perspective of urban development, the Nottingham vignettes indicated that built environment professionals are still adopting a very binary approach and attempting to design flood risk out using physical measures or engineering approaches. All cases demonstrated the limitations of relying on quantitative measures of flood risk, substantiating White's (2013) identification of this problem. For fluvial or riverine flooding, this largely involves measures to locate development outside of the higher risk Flood Zones 2 and 3, either by moving laterally or raising levels above a designated contour. Moreover, there also appeared to be some confusion amongst stakeholders about the risks associated with these zones and the protection offered by flood defences.

Fundamentally, this approach is enshrined by the 'sequential test', which dictates that certain uses are acceptable within the different flood zones and others not. However, the "Exception Test" allows this protection to be loosened if it can be proven by applicants that development cannot be located locally in areas with lower flood risk. Furthermore, it seems likely that the administration of this policy will become even more linear as the issue is increasingly decided by planning officers in

LPA's, often under political and economic pressure, rather than specialist flood officers at the EA.

In practice, developments work to meet a minimum standard, typically appropriated from notional lines on a plan and based upon a quantitative assessments of flood risk; these are applied as absolutes, rather than working to manage the flood risk in a more positive and holistic way. In the cases given, there is no indication that stakeholders have engaged with emergency managers who could have helped prepare emergency plans and people based approaches. Alternatively, could schemes help to fund new systems of flood detection and warning, or could the social engagement fostered by the urban design at Green Street, be used as a vehicle for community flood management? That the sequential test treats the issue as a binary, limits the discussion and thus eventual adoption of new flood management strategies.

The risk of surface water, or pluvial flooding, is much less comprehensively addressed; there was a sense from all vignettes that it was a risk that was not being adequately considered, and why the Ribblesdale Road rain gardens were seen as an exception. In practice, this may be due to the lack of information on the issue, although it remains unclear that the recent release of a publicly available surface water dataset will alter the limited efforts to tackle it.

In practice, vulnerability to pluvial flooding is often understood as the capacity of road gulley systems, but it is also closely related to sewer flooding which is not within the remit of developers or local authorities, whilst there are a host of other factors including, topography and soil composition, which can influence it. Perhaps,

it is because the risk of surface water flooding is so much harder to quantify, that it is overlooked. Several stakeholders noted that the "legalistic base" of the planning system requires absolutes and struggles with uncertainties. Further, it is a risk which requires consideration of the whole system, rather than looking at individual plots. Notably, this struggle to consider contextual issues and the relationship with surrounding developments, was highlighted by stakeholders in the previous chapter, as a major failing of how the planning system deals with urban design. Perhaps this reliance on certainty and absolutes could explain why design approaches such as SuDs, which are much harder to model quantitatively, have not been taken up more widely.

The study uncovered a number of potential maladaptations within the vignette studies, which are summarised in Table 8.1, below:

Table 8.1 – Summary of Maladaptations

PROJECT	DESIGN WEAKNESSS	EVERYDAY MALADAPTATION
Green Street	**Urban Planning** (Governance |Design)	**Stakeholder Involvement** (Governance |Design | Management))
	Hazard Mitigation (Governance |Design | Management)	**Emergency Response** (Governance
Nottingham Left Bank		**Hazard Mitigation** (Governance |Design | Management)
Hollygate Park	**Maintenance** (Management)	**Urban Planning** (Governance |Design)
		Hazard Mitigation (Governance |Design | Management)
		Architectural Design (Design)
Bakewell Drive	**Urban Planning** (Governance |Design)	**Stakeholder Involvement** (Governance |Design | Management)
	Architectural Design (Design)	
	Hazard Mitigation (Governance |Design | Management)	

(Source: Author)

Whilst the spectrum of maladaptations identified within Chapter 6 included fracture critical maladaptations, this has not been identified in any of the examples, as it would indicate the potential for total system collapse. Accordingly, the basis of this spectrum was the speed and impact, so whilst the limitations of coverage offered by the Left Bank flood defence could have the most significance, it is only after 2025 that coverage appears compromised. Notably, governance was an issue in the majority of maladaptations; at Hollygate Park, the issues surrounding maintenance

and architectural design were actually the result of local policies and decisions, despite these weaknesses not being associated with governance issues in the analysis of incidents.

Once again these maladaptations highlight the failure to address and appropriately manage the risk of flooding in all its forms. It can only be speculated whether this unwillingness to engage in the management of flooding is the result of a lack of knowledge or appropriate skills, or if developers are hiding the risk to avoid putting off potential buyers.[171]

Whilst many of these maladaptations could have been avoided by learning from earlier incidents, the Hollygate Park vignette in particular, highlights the problems of hard standards, proscriptive policies and unwillingness to deviate from existing ways of doing things. Somewhat paradoxically, the need to reduce weakness, failure and maladaptation within the built environment does not mean that new or untested approaches should be avoided. One possible consequence of the national policy of localist planning is that authorities may choose not to revise their policies in line with best practice, but to use older approaches or ones that require the least manpower.

Rather, the rain gardens at Ribblesdale Road demonstrated how new approaches offered opportunities for collaborative learning and capacity building, in a variety of areas. This highlights the need for greater flexibility in decision making and embracing uncertainty. It could be argued that the most significant maladaptation is actually a failure to change.

[171] From this small sample, it would appear that security considerations, such as Secure by Design, are much more mainstream within urban design practice.

Addressing this issue requires breaking down many cultural practices, professional norms and silos. Further, it presents challenges for all stakeholders, in particular designers. Whilst designers have shown some inherent understanding of adaptive capacity, the study has also highlighted a lack of engagement with risk management. Moreover, the unhelpful truism is that too often it is good designers that produce good design, rather than any particular methodology or dominant paradigm. However, it has been illustrated how enhanced resilience and better urban design share a foundation in understanding the context for intervention. Thus if designers adopt a contextual approach they can draw on understandings gained from the different paradigms as necessary. Similarly, Carmona's (2014) place shaping continuum is a helpful reminder that urban design is not a one-off activity. In Nottingham, urban design guidance is only applicable for the very centre of the city, and hence was not relevant to the projects studied within this chapter, but what if urban design skills were utilised within routine highway maintenance; could there be opportunities for gradually fitting rain gardens as pavements and drainage gulleys are replaced?

It can be argued that design approaches are critical to both the identification of maladaptation, but also the promotion of new development approaches, innovation and adaptive capacity. Further, the potential for urban design to either promote measures that enhance or reduce resilience has been demonstrated within this chapter. The example of how SuDS can enhance adaptive capacity has wider lessons; it is a transdiciplinary approach that includes elements of engineering, hydrology, landscape architecture and urban design, but also offers wider benefits to amenity,

not usually associated with drainage or flood management. It also alters the temporal relationship associated with these features, requiring ongoing management and learning to be successful. Finally, it is an approach that needs to be integrated from the start, rather than added retrospectively.

Critically, these examples appear to prove the model presented in the previous Chapter showing that built environment stakeholders only engage with each other through the planning process. Further, as planning can sometimes be shown to impede attempts to address maladaptations and build resilience, it highlights the need for new collaborative institutions, frameworks and soft spaces of governance to be developed.

9 LESSONS FROM PRACTICE, ANALYSIS & CONCLUSIONS

9.1 IMPLEMENTING RESILIENT DESIGN

The critical aim of this thesis has been to understand how cities can be reconfigured, physically, socially and environmentally, to address a range of disruptive challenges and to enhance resilience through the medium of urban design. Accordingly, this concluding chapter will use lessons from practice as a means to reflect upon this issue and to conclude the study.

It was argued within Chapter 6 that the failure to address the underlying vulnerabilities in New York's critical infrastructure, led to the extensive damage caused by Hurricane Sandy. Significantly, the event was a wake-up call for politicians and city leaders, which has led to $50 billion of funding invested in resilience initiatives (International Business Times, 2014), but this action has also been catalytic for urban resilience internationally, with New York emerging as an exemplar for resilient design through a host of innovative and best practices initiatives. It is also illustrative of many of the key arguments raised within this thesis.

In the wake of the event, there have been a number of post-Sandy publications and reports, which have shed further light on the failings that led to the disaster; in particular highlighting that if the recommendations for mitigation within the ClimAid (2011) report had been acted upon, much of the estimated $71.4 billion of damage to the city could have been averted (NYS 2100, 2013). Fundamentally, most of New York is only 3-4m above sea level and protected by flood-walls of just 1.5m high,

meaning that it is inherently vulnerable to inundation from the sea (Aerts et al., 2013). The maladaptions and design weaknesses highlighted within this study around the location and protection of New York's critical infrastructure, are substantiated by subsequent publications including Redlener and Reilly (2012), which notes the 'fragility' of the city's power systems as a result of inappropriate siting, before highlighting the massive exposure of healthcare facilities to future flood events. Similarly, a study by Wagner et al (2014) emphasizes the problem of poor land uses and unsuitable development locations, which exacerbated the event, driven by flawed risk management processes; it is suggested that the US has been stuck in a 'cost analysis' model for infrastructure investment and that given the low probability of events occurring decision makers were unwilling to act, despite the potential exposure of lives and assets.

A number of studies also highlighted the inaccuracy of New York's quantitative, flood maps; the Urban Land Institute (2013) observed that whilst many parts of Brooklyn and Queens were within areas designated by FEMA (Federal Emergency Management Agency) as special flood hazards areas (SFHAs)[172], the actual flooding after Sandy was almost double this area. However, a 1969 study by Ian McHarg, which attempted to identify the 'suitability of land for urbanization', using topographic and geographic analysis, almost perfectly predicted where it would flood (Wagner et al., 2014). Furthermore, McHarg suggested that areas 'unsuitable for urbanization' should instead be used for passive recreation and nature conservation, whilst he also recommended the construction of new 'barrier islands'

[172] Whilst this designation includes a number of different flood types, it is broadly equivalent to the UK's 1 in 100 year flood event contour.

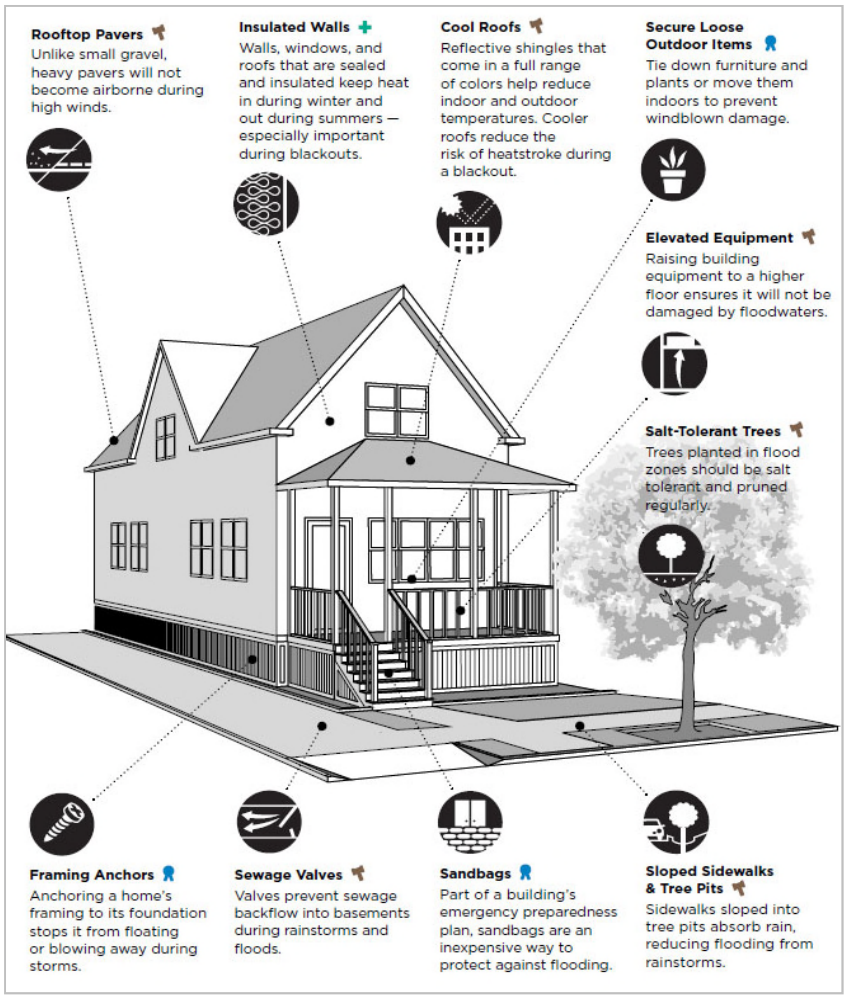
to protect the city from storm surge; as this section will further outline, McHarg's ideas are increasingly important to the development of resilience design within the city.

In the post-event recovery period, a 'Building Resiliency Task Force' was set up by the city's Mayor's Office in 2013 to identify measures to protect the city against similar events. Accordingly, the Task Force proposed improvements to the state's building codes around a number of themes; most notably 'Better Planning', which ensures that developments are located in suitable locations, as well as being prepared for future emergencies (Urban Green Council, 2013).[173]

Figure 9.1, below, demonstrates how these considerations can be integrated into a conventional New York property.

[173] Other themes included, 'Stronger Buildings', around improving wind robustness and flood protection measures, 'Backup Power' with provision for more generators and renewable systems and 'Essential Safety' with measures to ensure there is adequate post-disaster water without the need for power.

Figure 9.1 – Domestic Building Code Example



(Source: Urban Green Council, 2013, p.11)

Looking into the future, Lin et al., (2012) have suggested that with projected sea-level rises, storm surges of a similar magnitude to Sandy (broadly concomitant with a 1 in 100 year event) could occur every 3 to 20 years, whilst what is currently considered a 1 in 500 year event, could occur every 25 to 240 years by 2100. This pressing need to look forward, inspired the creation of New York State 2100 Commission to put together long-term planning proposals for the state, based upon preparedness, adaption and most critically, building resilience (NYS 2100, 2013). In addition to learning the lessons of Sandy, the report outlines a number of

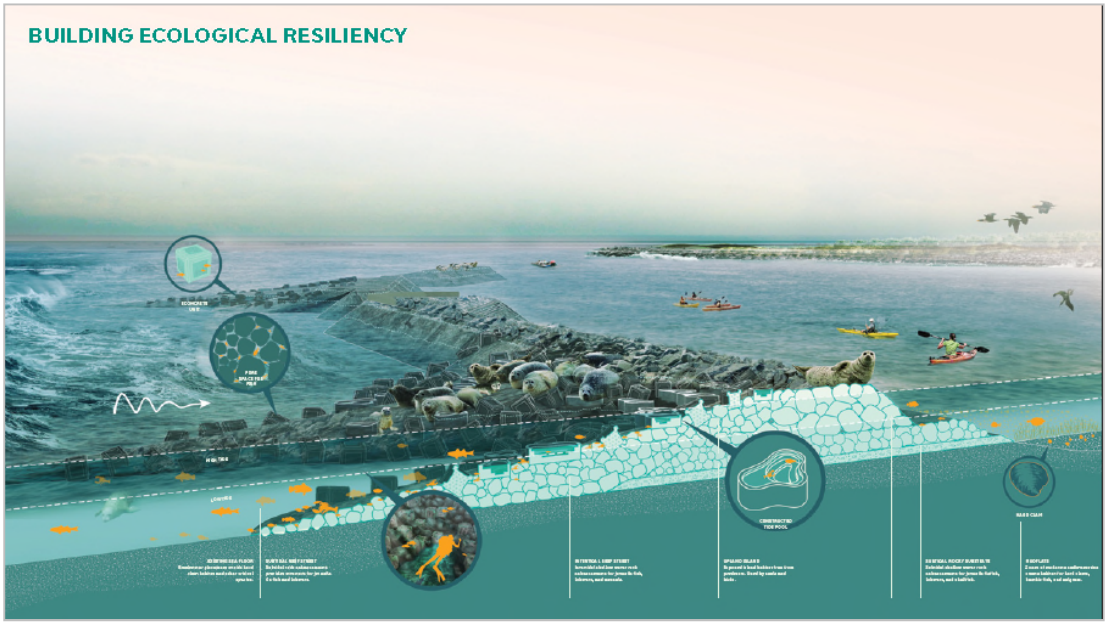
'challenges' for the state, including sea-level rise and extreme weather, and uses these to inform a range of tailored recommendations. These are focussed on the critical vulnerabilities of transport, energy and land-use, with a lesser focus on insurance and finance, whilst the report also considers a number of 'cross-cutting recommendations', which look more broadly at ways to enhance the state's resilience. These cross-cutting recommendations have many parallels to the lessons noted in earlier, empirical chapters, in particular emphasizing the need to 'rebuild smarter' and consider the appropriateness of land uses in relation to risks and vulnerabilities, increase the use of green infrastructure, ensure there is 'integrated planning' and increased coordination, and finally that there are sufficient 'incentives' for building resilience and more widespread, resilience education.

From the perspective of design, New York's *Rebuild by Design* initiative, which aims to promote resilience through transformative design and planning, is both innovative and more widely relevant to future resilience practice. Initially an open ideas competition it has seen six winning entries developed towards potential implementation, whilst gaining widespread media coverage and critical praise (Rebuild by Design, 2014). Despite the wide ranging remit and architectural focus of the competition entrants, who include design luminaries such as Rem Koolhaas, all designs utilise some form of green infrastructure. This is exemplified by Scape Design's *Living Breakwater* project for Staten Island, an area badly damaged by Hurricane Sandy and located upon a coastline that has been increasingly vulnerable to flooding as a result of years of inappropriate development; taking inspiration from the region's historic oyster beds, the aim of the project is to create new barrier

islands and breakwaters to protect the edge of Staten Island from the wave action and storm surges that devastated it in 2012; see Figure 9.2.

The project will also re-establish the associated system of coastal dunes, as well as providing new recreation opportunities and significant habitat improvements. As noted throughout this thesis, understanding the local context, including its history, whilst also looking for co-benefits and holistic solutions, lies at the heart of new resilient design initiatives. Not only is this project innovative and transformative, but it also represents something of a step into the unknown. Whilst based upon well understood principles, the approach is untested and it is envisaged as an ongoing experiment involving local learning and education, which it is argued will build 'social resilience' (Scape, 2015; Rebuild by Design, 2014; Guardian, 2014c).

Figure 9.2 – *Living Breakwater* Image



(Source: SCAPE, 2015[174])

Figure 9.3 – Representation of the *Dryline*

(Source: BiG, 2015[175])

[174] http://www.scapestudio.com/projects/living-breakwaters/
[175] http://www.big.dk/#projects

Figure 9.4 –Image showing *Dryline* in use for leisure

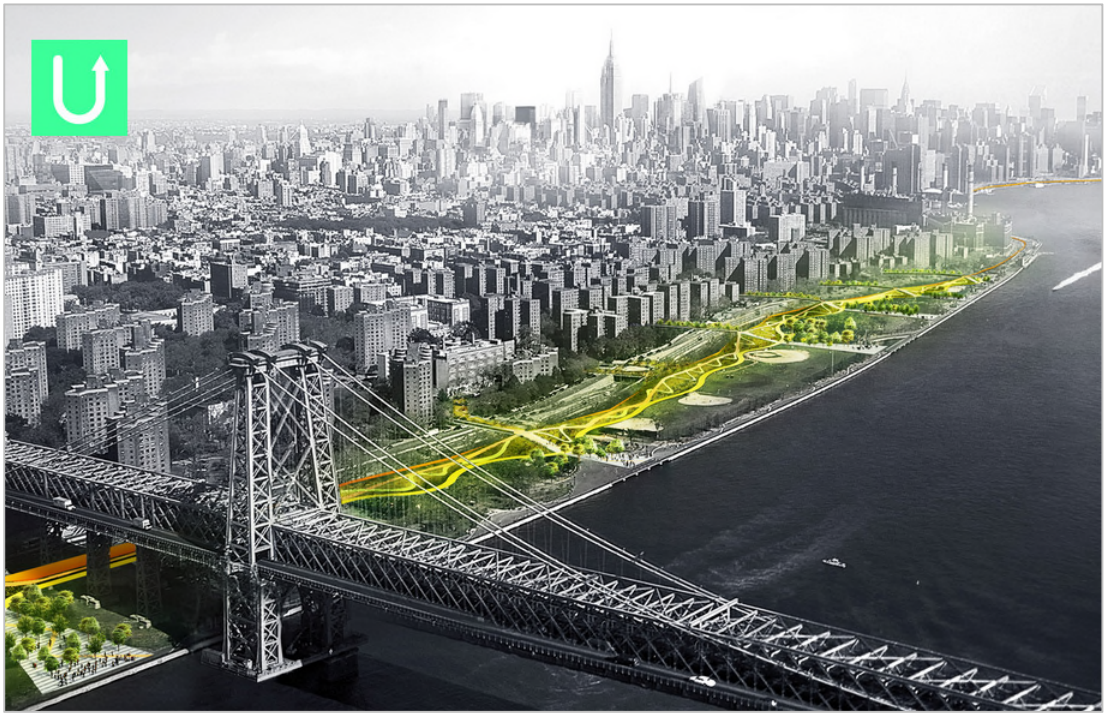
(Source: BIG, 2015[176])

Figure 9.5 – Image showing *Dryline* during storm event

(Source: BIG, 2015[177])

[176] http://www.big.dk/#projects

Figure 9.6 – Image of *Dryline* Park



(Source: BIG, 2015[178])

However, the project which has attracted most attention is BIG Architecture's *DryLine*; inspired by the Highline, it aims to convert the 10 miles of Manhattan's hard shoreline, with its bridges and infrastructure, into a continuous network of landscape buffers and 'protective park (Guardian, 2014c, 2014d; rebuild by Design, 2014); see Figure 9.3.

Developed by Danish architect Bjarke Ingles, the approach is based upon extensive analysis of Manhattan's vulnerabilities and exposure to flood, as well as studies of historic land use that show how the development of Manhattan has encroached onto the shoreline that once buffered against such events. The design incorporates a system of levees, dams and floodwalls which improves resistance to flood events,

[177] http://www.big.dk/#projects
[178] http://www.big.dk/#projects

integrated within a linear public park that finds imaginative uses for the resultant spaces; see Figures 9.4 to 9.6.

Whilst none of the proposed elements are revolutionary in isolation, the Dryline represents a new relationship with critical infrastructure; developed with an understanding of localised risk, but weaving in new social and environmental benefits. The Dryline challenges the assumption that flood infrastructure has to be detrimental to urban character, and highlights the co-benefits of considering issues of urban design and enhanced resilience in unison.

9.2 EMPIRICAL FINDINGS

A key objective of this concluding chapter is to reflect upon the results of the empirical chapters, as a way to assess the real world implementation of resilience policies within development practices and illuminate lessons for enhancing the resilience of cities through urban design and planning.

In general, the results of this thesis demonstrate the complexity of the urban medium and thus the corresponding multiplicity of measures for enhancing resilience; thus the ideas of 'resilience thinking' (Walker and Salt, 2011) and using understandings of resilience, outlined within Chapter 4, are critical to addressing implementation. Furthermore, there appeared to be more lessons around what Adams and Tiesdell (2011) termed second order design, involving policy constraints and governance arrangements, than actual design measures.

The most striking outcome of the analysis of urban incidents, contained within Chapter 6, was a validation of Fisher's (2012) contention that there are valuable

lessons to be learnt from past failures. Furthermore, that many mistakes were often repeated as a result of overlooking common failures and thus the dearth of post-construction evaluation. However, subsequent empirical chapters have highlighted the complexity of local arrangements for design, planning and governance, and thus the weakness of only looking at past mistakes, as Fisher advocates. Similarly, a key finding of the study was that enhancing the resilience of the built environment involves design and construction, planning and governance, as well as ongoing management and reflection.

The value of the identified design weaknesses was substantiated within Chapter 7, as an aid for analysing maladaptation (Barnett and O'Neill, 2010) within urban development processes, whilst the speed and scale of impacts provided a potential way of conceptualising the magnitude of affects and outcomes. More widely, the incidents illustrated flaws in the development process which had led to failures; accordingly, it was noted that this intervention had to occur at the right time and at the appropriate governance scale to facilitate risk management and mitigation (Bosher et al., 2007a; Coaffee and Bosher, 2008; Bosher, 2014). Thus, it was contended that risk management and resilience enhancement should be addressed through a three stage process, integrated into a rolling cycle involving strategic planning, urban planning and design, ongoing management and maintenance, evaluation and adaption; see Figure 6.13.

Chapter 6, which considered local governance challenges in Nottingham, outlined the messy arrangements for resilience, urban design and flooding, and in particular,

the lack of integration and engagement between specialist areas, such as planning and emergency planning. The complexity and siloed nature of operational networks for resilience outlined within the study recalls the comments of Sircar et al. (2013, p.50) on the effectiveness of UK resilience policies and infrastructure:

> *"Whilst decision-making and chains of responsibility may be well-established for particular infrastructures, critical points of vulnerability exist where these sectors meet and where governance responsibility is more ambiguous."*

This lack of interaction and collaboration amongst key stakeholders establishes the need for holistic governance (6 et al., 1999; 6 et al., 2002; Newman, 2001) and the adoption of resilience approaches that promote integration (Coaffee, 2013a and 2013b). One institution where a culture of engagement was observed, was the Local Resilience Forum (LRF); however, they actually struggled to engage with built environment stakeholders and there was a general observation that the LRF was not proactive enough in their work, echoing the observations of Bosher (2014, p.9) about *"planning to respond",* as opposed to *"planning to reduce or eliminate"* emergency events. What the LRF did demonstrate was an informal network of collaboration, building trust, dialogue and "community resilience" (Brassett and Vaughan-Williams, 2013); in effect a 'soft space' (Haughton et al., 2011), although this was often stymied by a lack of resources and horizontal integration, as well as differences with non-emergency response stakeholders, most notably local authorities. The success of the LRF is built upon shared values and goals; whilst it would appear logical to propose an expanded remit and greater 'teeth', there is a danger that it could be

diluted by different voices and subverted by the great political and economic pressures that act upon the development process.

Appropriately, the primacy of economic factors within the development processes was highlighted time and again; in particular how they 'fix' development norms which become culturally ingrained (Harvey, 1987), potentially perpetuating maladaptive approaches and stifling change. Whilst publications have suggested that there is a need for designers to engage more in the process of building resilience (Bosher et al., 2007a; Chmutina et al., 2014; Fisher et al., 2015), this study identified that developers and agents are the critical stakeholders, often shaping the form of development that others will implement. Addressing these 'gatekeeper' stakeholders requires an understanding of the economic forces which drive them, whilst changing their practices to make them more future focussed, potentially requires financial innovation. By contrast, designers interviewed were often intuitively interested in resilience, but were less engaged with risk management, whilst there was also suggestion that new forms of procurement were distancing them from critical decision making. Thus, it could be suggested that there is actually a third-order of design, concerned with developers, procurement and finance.

In effect, as urban development is outsourced to private companies, this is an example of the wider networks involved in contemporary urban government (Kjaer, 2009; Rydin, 2010; Nuissl and Heinrich, 2011), which can often make it more difficult to tackle 'wicked problems' (6, 1997). Similarly, the necessity to involve so many different stakeholders from both the public and private sector, in the process of flood management, makes it more challenging to find resolution.

Critically, flood resilience does not appear to be a particularly high priority for national or local policy makers, who have focussed more on enabling development and economic growth. This is demonstrated by the re-scaling of power and responsibility for flooding from the Environment Agency to local authorities; whilst this makes it easier to 'unlock' development within flood prone areas, it appears to have made it more likely that new developments will go ahead in spite of vulnerabilities to flooding. Similarly, the National Planning Policy Framework has created new 'loopholes', whereby developers can bypass controls in flood-prone development; e.g. the 'presumption in favour of sustainable development' where there is no up-to-date local plan in place. Finally, the torturous and convoluted process of funding flood defences, with the requirement for 'partnership', makes it much more difficult to agree the finance for mitigation, whilst the necessity to include development finance, threatens to create new *"loser regions"* in areas of limited market interest (Beck, 1992, p.112).

Once again, the local study of flood resilience and urban design within Chapter 7, highlighted how economic factors appeared to be given greater weight than issues of flood risk and resilience, when determining planning applications. More specifically, how at Green Street, Hollygate Park and Bakewell Drive, developments were approved with little flood mitigation but significant financial contributions to local services. Similarly, the significant political pressure for new residential development to go ahead also appeared to be an influence on local decision making. Interestingly, despite suggestions in the literature review that there has been a shift in development practices from sustainability to resilience (Zolli, 2012; Lees and

Imrie, 2014), it was suggested that residential developers can charge customers a premium for sustainability features, whereas resilience measures reaped no additional financial benefit; it could be speculated that if buyers were better informed of potential risks and vulnerabilities, this might not be the case.

Amongst the most important lessons uncovered, was the example of the Left Bank flood defences, which demonstrated how resilient design features can fit in to their context or positively contribute to the urban design. By contrast, at Green Street phase 1, the late inclusion of flood mitigation was detrimental to the character and appearance of the urban form; reinforcing the importance of early consideration of potential vulnerabilities within the design process (Bosher et al., 2007a). Whilst retrofitting has more limited mitigation potential, the rain gardens at Ribblesdale Road demonstrated how it can be used to make incremental interventions as part of routine maintenance and ongoing management.

More widely, risk management practices amongst built environment stakeholders attempt to design out risks, such as redlining within flood contours to meet minimum standards and avoid mitigation, rather than trying to manage risk. As such, education, awareness and people based approaches are not routinely considered; for instance, producing emergency plans for residents.

This reliance on quantitative measures is problematic, as White (2013) noted, being too often based upon past incidences and can skew consideration against factors which cannot be modelled in this way. Moreover, as a result of this reliance, contextual factors are often overlooked, whilst consideration is often solely on river flooding, ignoring surface water and integrated flooding which are increasingly the

most significant risk to cities (Pitt, 2008). Further, as one stakeholder from the EA noted, a 1 in 100 year flood risk behind a flood defence is not the same as a 1 in 100 year flood risk elsewhere.

Despite the establishment of an 'accurate' dataset for surface water, it is not being addressed sufficiently, whilst lip service appears to be paid to providing green infrastructure which can mitigate this hazard. As the 2014 flash floods in Nottingham demonstrated, it is still not possible to fully predict integrated flooding, given separate datasets for riverine flooding, surface water and sewer drainage; what is needed are the contextual and geographic flood approaches pioneered by McHarg in New York (1969).

The design weaknesses identified within Chapter 6, proved an effective way to evaluate the vignette projects and the maladaptions they embody, are often linked to a failure to change to new circumstances, such as highway guidance precluding surface water flood mitigation and proscribing outdated approaches. Most notably, the limited uptake of SuDS appears to be down to locked-in development norms, given that it is not potentially more costly. In this instance it can only be surmised that new policy from central government is needed to force local authorities and developers to promote SuDS.

The issue also highlights how the reduction of national policy guidance and the rescaling away from central governments, has led to fragmented approaches to flooding, which vary between authorities. Further, the danger of local authority proscription stymieing innovation was observed at Hollygate Park; many stakeholders felt this was a consequence of austerity in the public sector. Similarly,

to avoid becoming maladaptive, policies need ongoing evaluation; potentially difficult with shrinking staff numbers.

All vignettes hinted at the lack of urban design skills that Punter (2007) observed. However, it is argued that the very siloed way of dealing with issues, as seen in Hollygate Park, is potentially more problematic. By only considering from a very narrow perspective, it precludes the consideration of potential co-benefits, as demonstrated by the New York example in the previous section. In this context, urban design should be seen as the critical medium for transdiciplinary consideration, whilst by understanding it as a process, we are no longer limited to considering it at the point of a planning application.

Within the cases reviewed in Nottingham, the Hazard Mitigation and Urban Planning weaknesses appeared most significant, with a corresponding lack of adequate mitigation and by allowing inappropriate development. To some extent both issues stem from recent and more long-standing planning policies, and thus appear likely to be replicated more widely. The simplification, speeding up and cutting of 'red tape' that has accompanied the NPPF and the Growth and Infrastructure Act, is in direct opposition to the need for great integration between stakeholders, such as emergency planners, and community involvement. Furthermore, whilst recent rescaling of flood resilience functions appears to have given new responsibilities to local authorities and communities, it is doubtful whether the necessary power or resources have also been passed downwards, as Peck and Tickell (2002) warned.

Similarly, the recent Government decision to scrap almost all planning and design guidance is significant to the objectives of this study. Whilst there was some

comment amongst design stakeholders, that planners had adhered too closely to these documents, it seems unlikely that this move will improve the quality of design; rather it appears another sop to developers, which seeks to reduce their financial obligation and reduce work on design and planning. More concerning to designers, was the decision to remove design and access statements from planning applications, which were used to communicate the rationale for a design and could be helpful in determining whether the design was well considered and appropriate. Whilst it was also suggested that it could be a suitable medium for addressing issues of resilience, perhaps what is needed is a separate 'resilience statement' for potentially risky developments.

However, on the horizon is a potential paradigm shift in flood protection: Flood RE. Recent years have seen intense negotiation between the UK Government and the Association of British Insurers (ABI) to find a new way to fund flood insurance; until recently all flood insurance was covered from a single pot, covered by a subsidy on all premiums, and topped up by Central Government in the event of a major flood. However, the scale of recent flooding events, has stretched this funding mechanism beyond its limits and thus there is a need for a new agreement. Without an agreement, it was argued that between 300,000 and 500,000 households at risk of flooding would be unable to attain affordable insurance (ABI, 2014).

As part of the new insurance agreement, the government has committed to spending an undisclosed sum on additional flood defences. More generally, the ABI have been attempting to raise awareness of flood risk issues and lobby for them to be better addressed, through their *Flood Free Homes* campaign. The aims of this are

three-fold: *"Zero tolerance of inappropriate new developments in areas at risk of flooding"*, *"£1bn per year to be spent on managing flood risk by 2025 in order to keep pace with climate change"* and *"Cross party consensus on ambitious long term solutions that manage all types of flood risk"* (Flood Free Homes, 2015). These aims echo the findings of this study, including the role of inappropriate development, investment in defences and addressing sewer and surface water flooding.[179]

Whilst still funded by a levy on all premiums, Flood RE reduces the insurance cover in a number of key ways; most notably for this study, all properties constructed after the 1st January 2009 are now excluded from flood protection insurance. By contrast, properties that have flooded in the past, and which will be likely to flood again, will be covered in perpetuity with little incentive to adapt.

Despite this critical change in protection and the significant financial exposure, there has been no obvious attempt to increase standards of flood protection; instead, as this study shows, recent reforms appear to have eroded some of the checks on inappropriate development. It seems only a matter of time before a major flooding event affects these newly constructed properties, leaving many homeowners without financial recompense or protection.

Furthermore, a report by the Chartered Institute of Water and Environmental Managers (CIWEM, 2015, p.6) criticises Flood RE for not providing "the right incentives", by allowing properties in areas of known flood risk to be insured, rather than having to put in place their own risk reduction measures; in effect, it maintains existing maladaptive practices.

[179] The campaign website highlights 2.4 million homes at risk of surface water flooding (Flood Free Homes, 2015).

Whilst potential buyers need to be informed about this risk, perhaps the mechanism for tackling this issue will also be financial. FEMA (2003) guidance suggests that there is a 26% chance of a property within a 1 in 100 year flood zone of experiencing flooding within the lifetime of a 30 year mortgage. If the mortgage companies who provide the finance, and ultimately whose asset is at risk, begin to apply pressure to developers by not providing mortgages, then perhaps this could change the situation without further Government intervention. However, the ultimate lesson of this example, as with so many of the cases reviewed within this thesis, is that positive action is too often taken after a disaster has occurred, rather than taking steps to prevent it in the first place; resilience needs to be proactive rather than reactive.

9.3 FLOODING AND ADAPTATION IN THE UK

The flooding events of 2013 and 2014 brought many of the issues raised within this study back into public focus, as well as raising the potential spectre of increasing climate change induced, weather events. Following some severe winter storms and what was said to be the wettest December to January period since 1876 (Geographical Association, 2014), many parts of the UK were hit by severe flooding, including Devon, Dorset, Cornwall, the Thames Valley and most notably, the Somerset Levels. It remains to be seen whether these were freak events, or as seems likely, a precursor to a climate change driven world, which is harsher, more volatile and makes increased resilience critical.

As is so often the case, the event triggered some much needed public debate on the topic of flooding and the likelihood of worsening flooding in the future. Amongst political arguments over levels of funding (Guardian, 2014a), awareness raising over

potential mitigation from SuDS (Daily Telegraph, 2014a) and upland tree planting (BBC, 2014b) one of the most pointed observations came from the Daily Telegraph (2014b) which noted how many of the areas worse affected by flooding, had planning permission for many more houses to go ahead.

However, it was the floods effect on the Somerset Levels that grabbed the majority of headlines, with a focus on the resilience of the local community. Amongst the many issues highlighted, an interesting dispute emerged between locals who believed the floods had been caused by a lack of dredging, and a variety of experts including the Royal Society and Professor Richard Ashley, who suggested that it would worsen the situation (Thorne, 2014).

"These so-called experts haven't got a clue what they are talking about."

James Winslade, Somerset farmer (BBC, 2014c)

As a result of these acrimonious media quarrels and local criticism of the Environment Agency, affected residents formed a community flood group, the Somerset Flood Action Group (FLAG), to lobby for further dredging. Amidst accusations of political prioritisation of a 'swing constituency' (BBC, 2014c), local's views appear to win out with a multi-million pound programme of dredging begun shortly after the personal intervention of the Prime Minister (BBC, 2014d). Whilst it is perhaps too early to draw many conclusions, the changing of FLAG's emphasis from *"Dredge the Rivers!"* to "*Slow the Flow!"* (FLAG, 2015), appears to indicate that they have changed their views. It could thus be conjectured that the process of

managing their flood risk has educated the group on better ways of becoming more flood resilient, rather than relying on maladaptive approaches.

More widely, there is increasing recognition of the need to inform and educate communities about their flood risk (House of Commons Committee of Public Accounts, 2015; CIWEM, 2015). Ultimately, flooding should not be considered as something that happens to communities; rather there needs to be greater understanding that communities are part of the problem, but also integral to future solutions.

Many evaluations of the flooding made comparison to Dutch approaches to managing floods, although as Thorne (2014) notes, this is not always helpful given their different contexts and the many more types of flooding that affect the UK. However, an RSPB (2014, p.21) report highlights a comparison with direct relevance to this study:

> *"The Dutch are strong in innovation... The Dutch accept the risk that an innovative solution might turn out less cost-effective in the short term, as long as it helps develop these better approaches for the long term. The UK approach ensures the best possible short and medium term return on investment, but sometimes stifles innovation."*

Despite an initial glut of funding for flooding in the immediate aftermath of 2014, the UK imperative to reduce spending on flood mitigation is highly problematic; a press release by the National Audit Office (NAO, 2014) highlighted a 10% real-terms reduction in total flood spending and noted that only 50% of flood defences are

adequately maintained, whilst some will have to be abandoned. As others note, the introduction of partnership funding has been a way of reducing government spending on the area, despite the long term cost effectiveness of flood defences (RSPB, 2014). Thus the need for greater public investment in flood mitigation has been highlighted by a number of influential sources (House of Commons Committee of Public Accounts, 2015; CIWEM, 2015).

However, the most damning commentary of contemporary UK flood policy has been from the independent Committee on Climate Change (CCC), and their Adaption Sub-Committee (ASC).[180] Highlighting the many ways the UK is failing to adapt to climate change and in particular potential flooding, Chairman of the ASC, Lord Krebs wrote to the Secretary of State to express concern at the proposed policy on SuDS and the wider failure to implement the Pitt's recommendations on flood mitigation. Pitt had suggested that Lead Local Flood Authorities should setup SuDS Adoption Boards, obligated to maintain SuDS facilities, whilst by removing the automatic right to connect new developments to drains, it would greatly increase the use of SuDS. However, recent Government policy rejects adaption and is an effective continuation of the status-quo in England and Wales, despite the suggestion by the ASC (RSPB, 2014) that only 10% of planning applications currently utilised SuDS.

This issue shows how even when a change is cost neutral, policy action is often needed to initiate a corresponding change in culture. Of the selected recommendations from Pitt's review of the devastating flooding of 2007, detailed

[180] The Committee on Climate Change (the CCC) is an independent, statutory body established under the Climate Change Act 2008, to advise the UK Government and Devolved Administrations on preparing for climate change.

within Chapter 4, only 15 has been fully implemented. This wilful failure to put in place measures that will prevent similar events occurring in the future, is symptomatic of a dysfunctional attitude to risk, which erodes the nation's resilience.

In a recent parliamentary committee considering climate change and the failures of the present flood management regime, the CCC's Head of Adaption, Daniel Johns suggested that, *"NPPF is driving what is happening with flood risk."* His wider argument was that the increased focus on economic issues, and the need to allow planning permission for many more houses, had left developers free to provide inadequate flood risk assessment, or to argue against providing flood mitigation on the grounds that it is financially unviable.[181]

Most worryingly, it was noted that as of March 2015, only 16% of local authorities have a flood plan in place (NAO, 2014). With increased pressure for new residential developments and with further cuts to local authority staffing due to come (Carpenter, 2012), a picture emerges of a widening gap between what national government wants and the ability of local institutions to implement corresponding urban resilience policies.

9.4 SUMMARY OF STUDY FINDINGS

Presented within the introduction to this thesis (section 1.4), was a broad aim of understanding how cities can be reconfigured to address a range of disruptive challenges and to build resilience, as well as a number of more specific questions. Whilst these issues have been explored within the previous sections, it seems

[181] The committee also touched upon, the 'non-spatial' nature of the NPPF, the failure to consider 'cumulative impact' and the suggestion that risk assessment methodologies were overly complex and inadequate.

appropriate to reflect upon these questions in turn, as a means to provide a summary of the study outcomes.

The questions were:

- What can we learn from earlier shock events and what lessons can be drawn for future practice?

- From a UK perspective, how can an evaluation of local governance arrangements and the framework for resilience be used to understand the effectiveness of national resilience policies?

- How can a review of local urban design projects, help us to understand the appropriateness of urban design and planning approaches?

- How can urban design and planning be used to secure cities against multiple risks and make them resilient to exogenous shocks?

In contrast to the majority of resilience literature, that have approached the topic from a deductive perspective, this research has taken an inductive and reflexive approach that has grounded the conceptualisation of resilience in the messy, complex world of praxis. This study is also based upon the premise that past events hold the key to future enhancement of resilience. Not only can an understanding prevent similar disruptive events from occurring again, when acted upon, but it can also be used to identify wider areas of weakness, maladaptation, and potential adaptive capacity. Critically, it has identified how resilience is contingent upon the

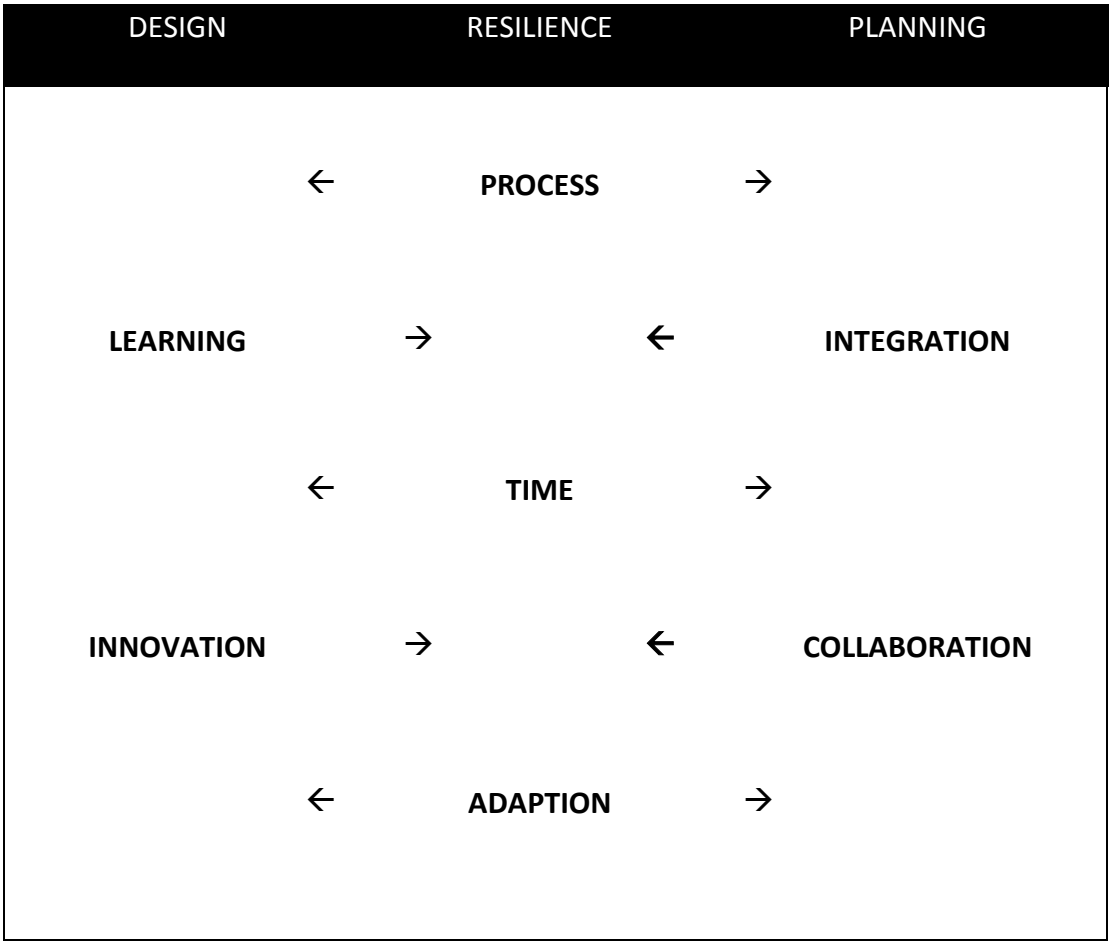
ongoing enhancement of contextual design, planning and management strategies, whilst the right timing and scale of decision making is also vital. By contrast, the preceding sections have outlined the dysfunction and unrealistic expectations of national policies, which are manifest in the fragmented local arrangements for design, planning and flood resilience. These have been worsened by narrow policies intended to boost economic growth, a lack of resources in local government and an unwillingness to legislate for enhanced resilience. At a macro-scale there is a need for greater vertical and horizontal integration, through greater collaboration and 'soft spaces' for transdisciplinary engagement, as well as more resources and legislative power for these institutions.

At a micro project level, many of the failings of the current system were more vivid; in particular the limitations of local government to drive developments that are well designed and will enhance the resilience of cities. Certainly, they emphasize a need for better risk management, increased innovation and the need to find co-benefits. More widely, the case study vignettes highlighted critical maladaptions in urban planning and mitigation, which should accordingly be addressed through planning and urban design strategies.

Resilience should be seen as a pragmatic approach for achieving effective results, balancing cost and resources against the likelihood of events occurring. It also provides a theoretical framework for working in a complex context. Thus, urban design should not be seen as a substitute for planning, rather planning should provide 'horizon scanning', collaboration and the integration of stakeholders. Design provides ideas, technical solutions, space for learning through practice and as a way

to put qualitative and contextual approaches into practice. Urban design should be seen as the location where all these issues can be brought together, and as such it is contended that design, resilience and governance have critical congruences, which can inform wider practice; see Figure 8.7, below.

Figure 9.7 – Congruencies in Design, Resilience and Governance



(Source: Author)

Principles for Resilient Urbanism:

As the culmination of this study, some simple principles for implementing resilient urbanism have emerged from this work and are presented below:

- **Change Paradigm and Adaptive Capacity**

The only constant in a dynamic world is change itself. It should be anticipated that the urban context will change and thus urban planning and design strategies will need to adapt. Building adaptive and institutional capacity assists this process.

- **Complex Medium and Contextual Approaches**

  The urban medium is a complex dialectic between social and environmental factors. Strategies will not work as expected and what is effective in one location may not be in another. Thus, contextual and reflexive practices are needed.

- **Integration and Collaboration**

  Resilience approaches are founded upon holism. This can only occur when there is integration and collaboration between stakeholders, professions and communities.

- **Proactive Risk Management**

  Whilst risk management is not the same as resilience, a process of understanding potential risks and vulnerabilities is critical to establishing where interventions and mitigation should be directed, as a means to enhance resilience.

- **Development and Risk Management Cycle**

  The process of risk management, like urban design and development process, have too often been seen as a one-off action; rather it should instead be seen as an ongoing cycle of evaluation and potential intervention.

- **Pragmatism**

  In contrast to the theoretical nature of many theoretical approaches, resilience practice can be seen as pragmatic approach of providing appropriate measure and capacity to meet present and future challenges, informed by ongoing learning and research.

- **Innovation**

  Critical to meeting the challenges of a changing world is finding new, innovative and transformative ways of designing, planning and adapting our cities for future uncertainty.

- **Learn from Practice**

  Given the complex, dynamic nature of urban systems, only by learning from practice, can we find reliable, replicable strategies for enhancing the resilience of cities.

Study Evaluation

It seems appropriate that the final subsection of study findings, should consider the study's limitations and thus scope for further research. It is important to acknowledge that the basis of the multiple, case study analysis of urban incidents (Chapter 6) was primarily secondary data; had it been possible to use more information from verifiable sources, in effect to conduct a 'meta-analysis', there could be greater confidence in the results. Likewise, whilst the embedded case study

format allowed the study of more than one administrative authority, the selection of only a single location for the case study limited the scope for evaluating local decision-making, more widely. However, within the context of flood resilience considerations, it was often wider national policies, such as the NPPF, which drove the problems that this thesis has outlined.

Whilst the study identified the importance of social input into both urban design and resilience strategies, only development and emergency services stakeholders were interviewed for the study. Both groups of stakeholders were able to engage with the research through the common frames of risks and developments, which it was felt that other community stakeholders would not be able to do; it would be valuable for future research to engage outside of these professional circles. Finally, it is acknowledged that the critical stakeholders for this study were local planning officers, who proved extremely difficult to engage in this research. Inevitably, some important contextual information was not captured as a result of this. Thus any future studies of how urban design and planning can enhance the resilience of cities, should consider how to encourage planning officers to participate.

9.5 CLOSING THE IMPLEMENTATION GAP

The introduction to this thesis placed the search for the enhanced resilience of cities, within a wider global challenge of addressing climate change and making accommodation for future disruption. This positioning is substantiated by the Royal Society (UK) in their 2014 report on Resilience to Extreme Weather:

> *"Climate change will affect the frequency and severity of extreme weather in the future... Both mitigation of climate change and adaptation are therefore vital."*
>
> (2014, p.2, emphasis added).

This point mirrors analysis of climate change policies by Brown (2012), who has highlighted the predominance of incremental approaches which support the status quo and focus upon a return to a stable equilibrium, rather than enacting transformative change which is often necessary to encourage more long-term resilience. This also echoes the findings of the empirical chapters which uncovered an absence of long-term consideration, stifling of innovation and a lack of action upon issues of resilience.

In evidence of this, Pelling (2011) has observed that the political challenge of adjusting to a changing climate is made more difficult by path dependencies, associated impacts upon development norms and governance structures. Accordingly, UN-Habitat (2011, p.27) have found the response of cities to these new challenges have been fragmented, with significant gaps between the rhetoric and the realities of action on the ground.

It is thus argued that there is a need to integrate more long-term thinking and innovation, implemented through transformative practice and that urban design offers the appropriate medium to do so.

Urban design is increasingly seen as a remedy to an ever-increasing array of socio-economic problems, policy priorities and risks facing contemporary society, for

which resilient responses are required. However, the majority of work in the burgeoning field of urban resilience is seldom grounded within the everyday practices of urban designers and planners; there is an 'implementation gap.'

Such an implementation gap was highlighted by the impact of Hurricane Sandy in New York in 2012, with the independent Wilson Center noting that:

> *"The word 'resilience' was everywhere – even on the sides of buses touting New Jersey as "A State of Resilience." But evidence of actual planning for resilience was scant."*
>
> (De Souza and Parker, 2014, emphasis added)

Within this context, it has been argued that the key to overcoming this is learning and embracing systematic change. Thus within the fields of urban design and the built environment, this involves learning from practice and past failures as a means to inform future design solutions and transformative adaptation (Fisher, 2012). From the perspective of urban governance and planning, there is a growing understanding that earlier policy failures offer learning opportunities about their 'emergent interconnections' in a complex world, an understanding of which allows for more integrative urban policy (Chandler, 2014) and as a means to promote 'adaptive governance (Healey, 2012; Carp, 2012; Resilience Alliance, 2012).

What is clear from debates about urban resilience is that urban designers cannot function in isolation; rather they must be part of a more integrated urban management nexus which considers urban design and resilience enhancement as part of an ongoing cycle. Accordingly, resilience should be seen as a continuous

journey that helps us to define the problems at hand but also to develop more wide-reaching design solutions that mitigate emergent issues through adaptation, innovation and collaboration.

Although it has been relatively easy to highlight the practices of built environment professions as a barrier to implementing resilience (Bosher and Coaffee, 2008, Coaffee and Bosher, 2008), we should not forget the key role that education can play in better aligning future efforts in this crucial area. There is an important role for training and skills development to raise awareness of resilience approaches (Chmuntina et al 2014), which can come through student-centred courses or through continual professional development, where skills can be forged in a multidisciplinary and multi-professional environment, mirroring the complex reality of urban resilience practice. Whilst the UK and many other countries have been slow to adopt such an integrated approach, we can look to the recently emerging US model to see what might be achieved in training a range of built environment professionals to deliver adaptive and collaborative learning. In May 2014 a collective industry statement on implementing urban resilience was signed by representatives of America's design and construction industry (including the professional bodies for planners, architects, chartered surveyors, interior designers, landscape architects, engineering) stating that, *"Together, our organizations are committed to build a more resilient future."* Critically, this statement also highlighted the key role of learning and education:

"We educate our profession through continuous learning. Through coordinated and continuous learning, design, construction and operations

professionals can provide their clients with proven best practices and utilize the latest systems and materials to create more resilient communities."

(The American Institute of Architects, 2014)

Orchestrating a coherently joined-up approach to enhancing the resilience of our cities, to meet the rising threat of anthropogenic climate change and other unforeseen risks, may be the greatest challenge of our generation. It can only be overcome if urban planning and design practitioners come together with academic theoreticians; with successful learning from practice.

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APPENDIX

STUDY INTERVIEW PARTICIPANTS

[redacted] (LA) Urban Designer - Blueprint

[redacted] (RA) – Professor of Urban Water – University of Sheffield

[redacted] (AB) - Area Manager/Planner - Homes and Communities Agency (HCA)

[redacted] (FB) – Flood Manager – Nottingham City Council (NCC)

[redacted] (KB) Architectural Liaison Officer (ALO) – Nottinghamshire Police

[redacted] (KC) – Station Manager- Nottinghamshire Fire and Rescue

[redacted] (PC) - Landscape Architect - Groundwork

[redacted] (MD) - Community Flood Consultant - [redacted] Associates

[redacted](BP) – Chief Executive/ Developer – Blueprint/Igloo

[redacted] (RF) – Director/Architect - CPMG

[redacted] (MG) – Senior Emergency Planner - Environment Agency (EA)

[redacted] (TG) – Managing Director/Surveyor – Innes England

[redacted] (CH) – Emergency Planning Officer – Western Power Distribution

[redacted] (GH) – Senior Partner/Landscape Architect/Urban Designer - FPCR

[redacted] (SI) – Director/Landscape Architect – Illman Young

[redacted] (AJ) – Independent Planning Consultant – Formerly Head Planner NCC

[redacted] (SK) - Urban Designer – Nottingham Trent University/ Northwest Leicestershire District Council

[redacted] (JM) – Partner/Architect - Marsh-Grochowski

[redacted] (DM) – Director/Urban Designer – Munro + Whitten

[redacted] (DP) – Head of Design Support Services/Planner – Opun/ Formerly Planner at NCC

[redacted] (GP) – Planning Specialist – EA

[redacted] (LR) – Head of Midlands South/Planner – HCA

[redacted] (AR) Director/Architect – Church Lukas

[redacted] (PS) Emergency Planner - NCC

[redacted] (JS) – Senior Emergency Planner- NCC

[redacted] (ES) - Emergency planner – Nottinghamshire County Council

[redacted] (DS) – Director/Landscape Architect - DSA

[redacted] (TS) - Infrastructure Strategy – Severn Trent Water

[redacted] (DS) ALO - Nottinghamshire Police

[redacted] (JT) – Chief Executive/Planner - Opun

[redacted] (DT) – Chief Executive/Urban Designer - MADE

[redacted] (IT) – Civil Contingencies Research Officer - Nottinghamshire Police

[redacted] (DW) Flood Risk Officer – EA